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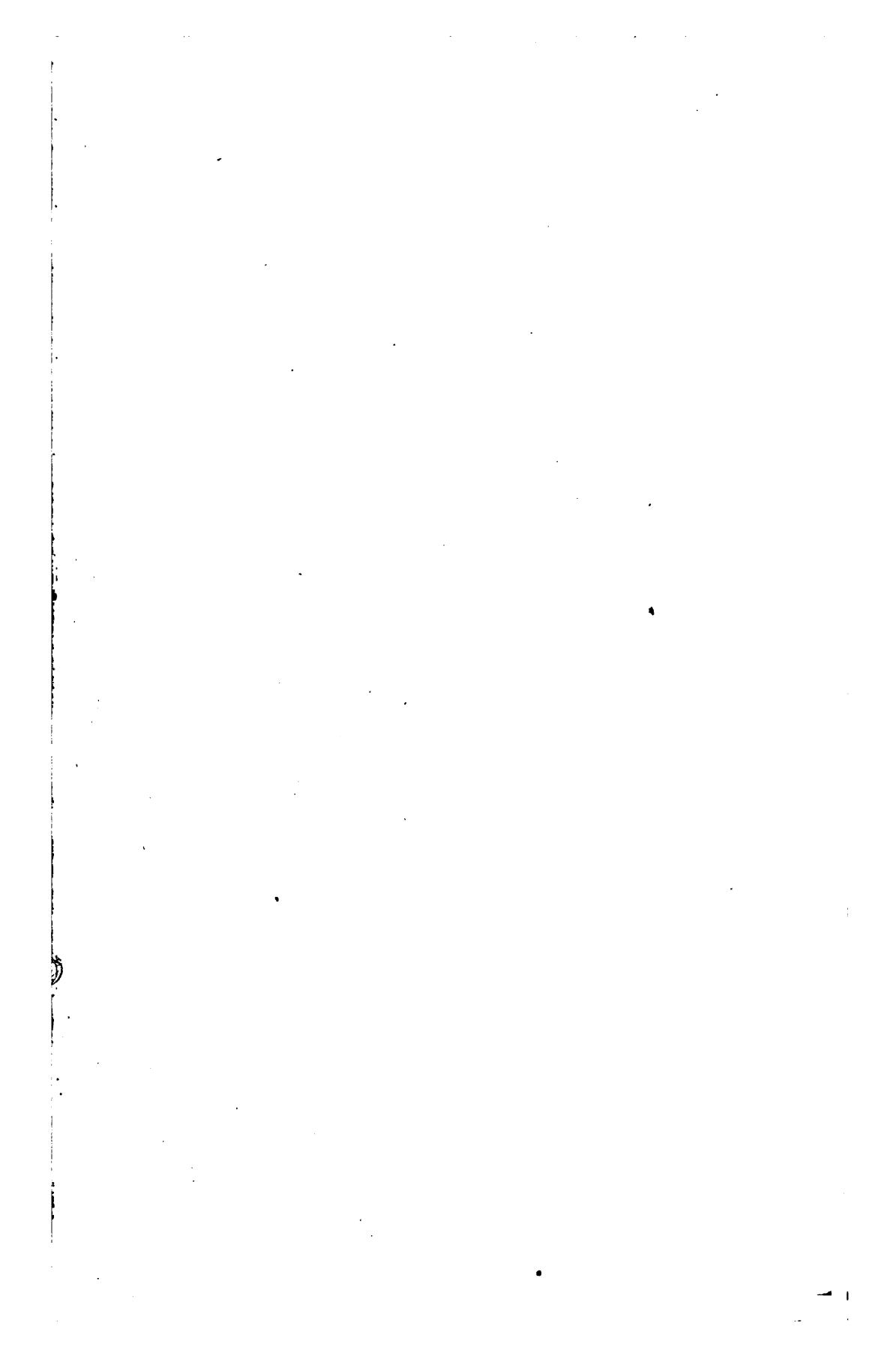
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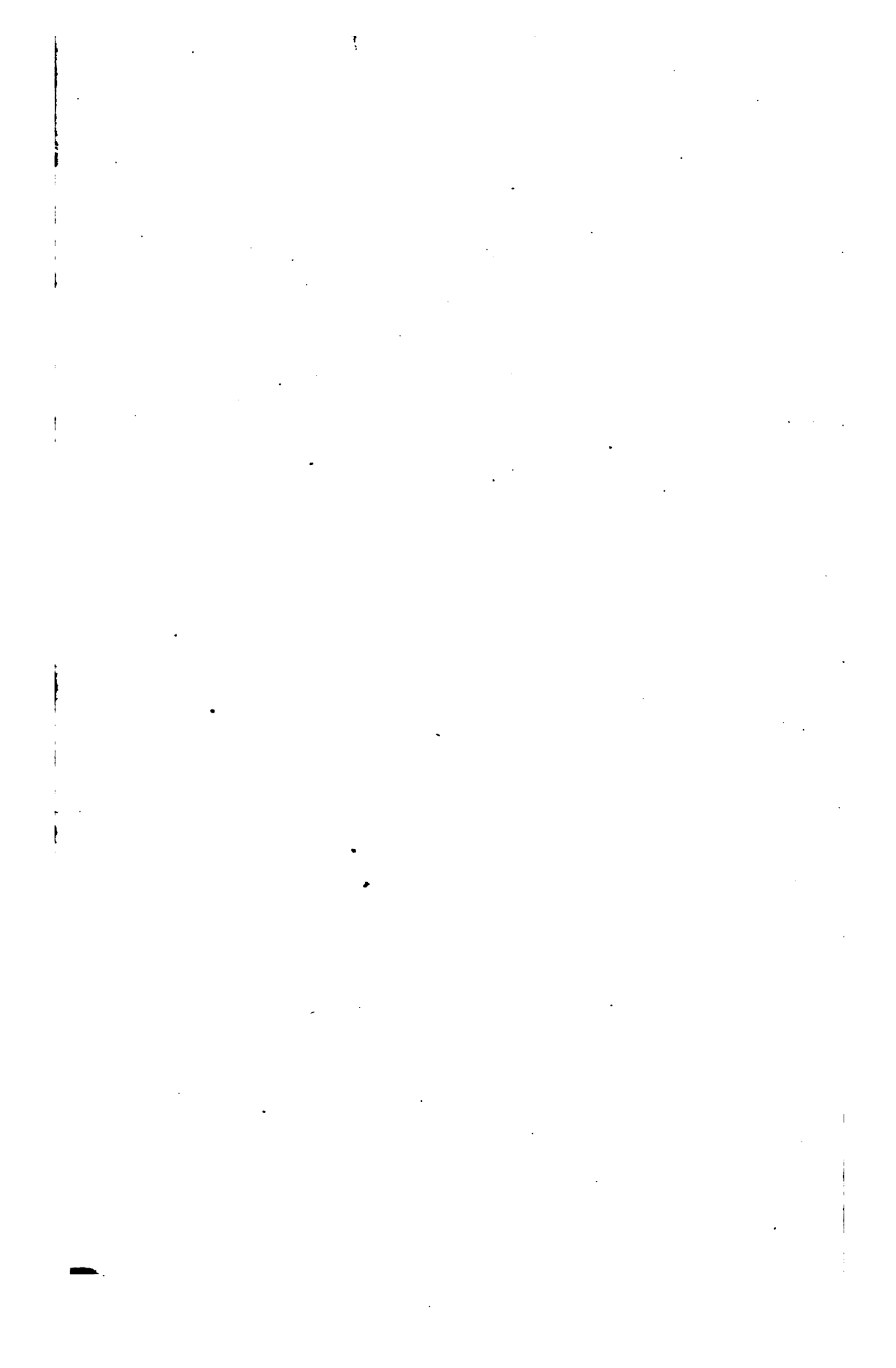
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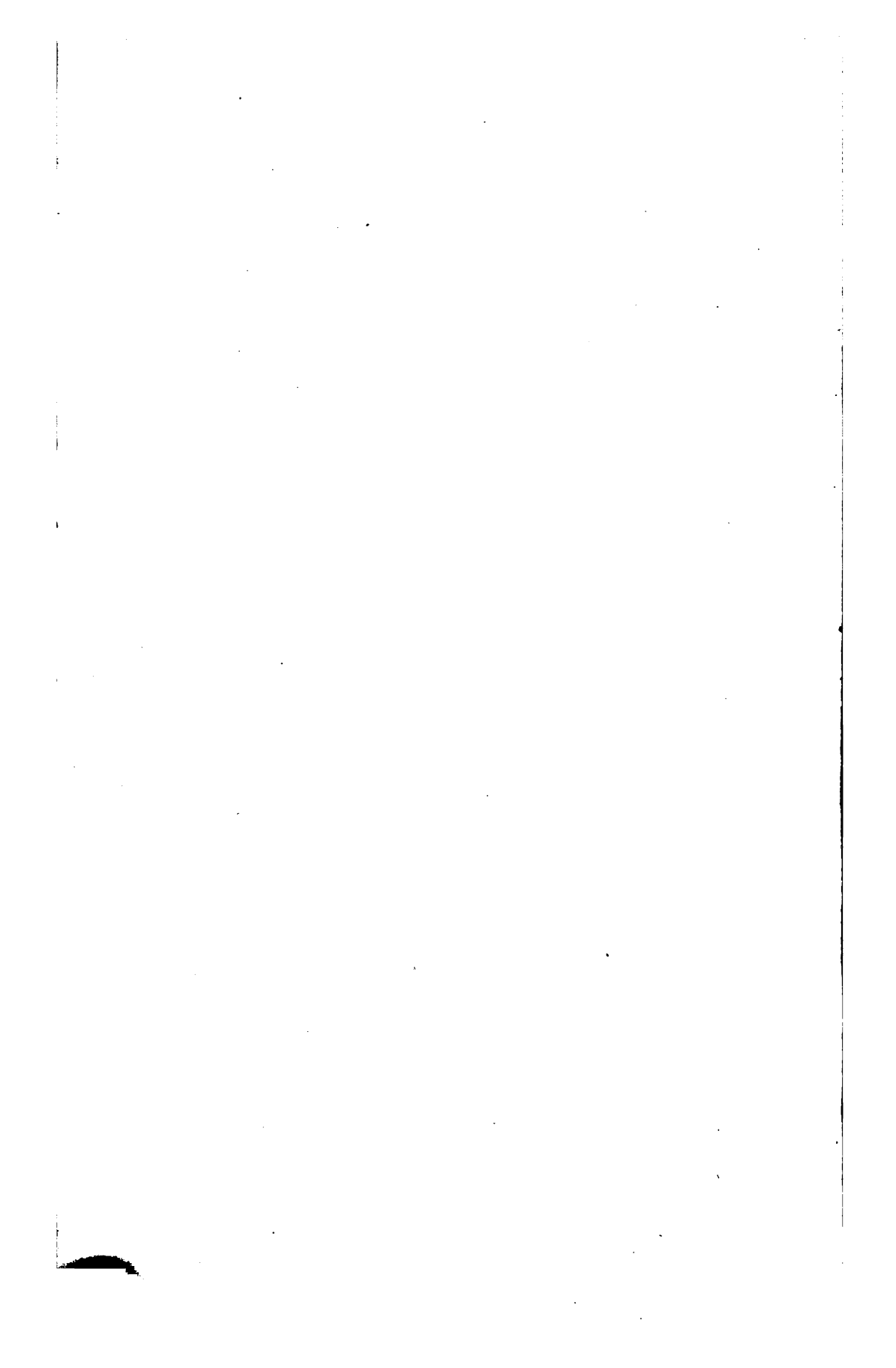
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VOCAL PHYSIOLOGY.

A PRACTICAL TREATISE.

BY

DOCTOR CHAS. ALEX. GUILMETTE,

*Formerly Primo Basso Assoluto of the Imperial Chapel at Rio de Janeiro of H. I. M.
Don Pedro II., Emperor of the Brazils and Rio de Janeiro.*

C.

CONCORD, N. H.:
CHARLES C. PEARSON.

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I first conceived the idea of the publication of a work on vocal physiology, in the year 1844, when it was my good fortune to meet M. Arnaud, at that time first tenor at the French Opera, New Orleans, the first person from whom I obtained thorough practical instruction in lyrical declamation. As the result of that instruction, I felt myself competent to pursue the subject unaided, and commenced the examination of the most noted writers on vocal physiology. I read them carefully; rejected such fallacies as I found inconsistent with modern anatomy and physiology; applied what I had gleaned from all sources to myself and others, until I had deduced what I believed to be the fundamental principles of the subject.

In 1860, while delivering a course of lectures at Cooper Institute, New York, my exercises on respiration attracted the attention of Rev. Edward Winthrop, because of their originality; and at his request permission was given him to publish them in catechismal form. Two thousand copies were sold within thirty days of the date of publication.

It was my intention to have supplemented this work with the present treatise within a year; but professional duties, and later, impaired health, have prevented rapid progress. During all this time I have pursued these investigations, candidly

TO THE PUBLIC.

testing my own theory and those of others, desiring to remove all excrescences and arrive at the simple facts, unalloyed.

Recently, I have been earnestly requested by friends interested in the subject, and urged by evident public requirement, to prepare this work. It has been written at such intervals of leisure as I chanced to obtain from arduous professional labor, and has not been subjected to that careful criticism and revision which such a work imperatively demands. It was not given to the press until late, and its publication has necessarily been hurried, in order that it might be issued before a certain date. I am, also, aware that foreign idioms crept unconsciously into the work, which, with more ample time, would have been revised by the author. But, such as it is, I present it to the public, bespeaking for it generous criticism in these particulars. Should it meet with favor, I shall endeavor, in future editions, to make it more complete in many respects, and less open to criticism in purely technical details.

CHARLES A. GUILMETTE.

CONCORD, N. H., January 29, 1877.

INTRODUCTION

BY THE

REV. EDWARD WINTHROP, A. M.

THE IMPORTANCE OF THE RHETORICAL ART.

Among the illustrious men of Europe who have written, during the nineteenth century, on the mechanism and diseases of the human voice, are Colombat De L'Isère, founder of the Orthophonic Institute at Paris, and François Bennati, Physician of the Italian Theatre in that city.* Each of these

* Bennati was born at Mantua, in 1788, and died at Paris on the 10th of March, 1834. See the *Nouvelle Biographie Générale*. Paris, 1855. Tome Cinquième, p. 367, Art. *Bennati*.

For biographical sketches of Colombat De L'Isère see the *New American Cyclopædia*, published by D. Appleton & Co.,

great men gained a prize for the labor of his brain, and each was eminently successful in the practice of his profession. Bennati, himself a vocalist as well as a physiologist, restored the voice to its healthy functions in many instances of *aphonia*, and other maladies;* and Colombat De L'Isère from November, 1827, to April, 1840, out of six hundred and eighty-three cases of all sorts of defects of speech, gave permanent relief in five hundred and twenty-four.†

New-York, 1859. Vol. 5, p. 485: also Pierer's *Universal Lexikon*, (a work in the German language,) Altenburg, 1850. Vol. 4, p. 171. Art. Colombat De L'Isère.

These books containing the notices of Colombat and Bennati, as above, will be found in the New-York Mercantile Library. There is another notice of Colombat De L'Isère in the *Conversations-Lexikon* (German) Leipsic, 1852. Vol. 4, p. 296.

* See Bennati's "*Recherches Sur Les Maladies qui affectent les organes de la voix humaine.*" Pp. 59-112. Paris, 1832.

† See the tabular statement annexed to the second volume of Colombat De L'Isère's great work: "*Traité de tous les vices de la parole, et en particulier du bégaiement, ou Recherches*

In England there have been various works on the vocal organs, and their treatment, both in health and disease. It will be sufficient to enumerate Gardiner's *Music of Nature*, Vandenhoff's *Elocution*, Bishop on the *Impediments of Speech*, Urling on *Vocal Gymnastics*, Hunt on *Stammering*, and on the *Philosophy of the Voice*, etc., Charles W. Smith's pamphlet on "Reading, Speaking, and Action," Dr. Mackness on "*Dysphonia Clericorum*,"* and the chapters on Clergymen's sore throat, in Dr. Fenwick on "the causes and prevention of diseases."

In our own country we have had Rush, and Russell, and Barber, and Bronson, and Comstock, and Sargent, and Mandeville, and others, in whose works, as in those published

theoriques et pratiques sur L'Orthophonie." Troisième Edition. Paris, 1840.

The author of the above work received from the Royal Academy of Sciences, a prize of five thousand francs.

* Clergymen's Difficulty of Voice.

in England and France, will be found much valuable information respecting the human voice.

But after all that has been done, the field is not yet exhausted. Vocal diseases seem of late to have rapidly increased; and both in public and private life many are those whose comfort and usefulness have been more or less impaired by these insidious maladies.

In the city of New-York, Dr. Charles Alexander Guilmette has gained an enviable celebrity, not only by his great theoretical knowledge of the voice, but also by the application of that knowledge to the development of the respiratory and vocal mechanisms. Second to none as a professional singer, and remarkably skillful in the treatment of vocal diseases, he has already succeeded in awakening, to a considerable extent, the attention of the public to the physiological cultivation of organic elocution.

Having, while an inmate of Dr. Guilmette's family for more than six months, enjoyed unusual opportunities for becoming acquainted with his progressive method for the education of the human voice, I have here attempted, with his sanction, to unfold it.

This great system has been brought to the test of actual experiment in the training of his own voice, and in the advantage received by those who have availed themselves of his instructions. It needs no recommendation from me. It stands on its own merits. The diligent student has only to practise faithfully, judiciously, and perseveringly, the respiratory and vocal exercises here set forth, and, perhaps to his own surprise and that of his friends, he will soon have, in the invigoration of his health and the improvement of his voice, demonstrative evidence of its truth.

I have taken some pains to examine the best English, American, and French writers on the human voice, and I hazard little by

the assertion that there will not be found in any of them, within the same compass, as great an amount of useful, practical information, in regard to the scientific training of the respiratory and vocal organs, as Dr. Guilmette imparts orally to his pupils in that course of lessons on vocal physiology which is embodied in the present work.

And is not the subject one of the very highest importance? The sad deficiencies of a large proportion even of educated men, in respect to vocal culture, is a matter of daily observation. The same training, essentially, is necessary to make a good elocutionist, as to make a good singer; and yet years are devoted to music under the best and most celebrated professors, while the occasional reading or recitation of a piece of prose or poetry, at school or college, is too often practically regarded as sufficient to make an accomplished orator.

Not so thought the great masters of the

rhetorical art at Athens and Rome. Day after day, and year after year they devoted themselves to its most assiduous cultivation. We learn from Quintilian a fact which he relates on the authority of Cicero, that "Caius Gracchus, in deploring his brother's death, excited the tears of the whole Roman people."* In the third book "*de oratore*," Cicero records the words of Gracchus, and says that such was the effect of his delivery "in the eyes, the voice, the gesture, that his enemies could not refrain from tears"—"*oculis, voce, gestu, inimici ut lacrimas tenere non possent.*"†

When Æschines, after his unsuccessful prosecution, nominally of Ctesiphon, but really of Demosthenes, was banished to

* "*Eadem* [*by the same, that is, actione, by action, delivery,*] C. Gracchum, in deflenda fratris nece, totius populi Romani lacrimas concitasse." Quintiliani Institutionis Oratoriæ Lib. xi. Cap. iii. § 8.

† *De Oratore* Lib. iii. Cap. lvi. § 214.

Rhodes, he read to his pupils the great oration of his eloquent antagonist; and when his audience expressed their unqualified admiration, what would you have thought of it, said he, had you heard him deliver it himself?

Accordingly, notwithstanding the indefatigable pains which the orators of antiquity were accustomed to take with the subject matter of their discourses, in the selection and arrangement both of the topics and the words, they regarded delivery as of supreme and paramount importance. This was what they meant by "*action*," when they assigned to it the first, second, and third place in eloquence. For, when Cicero, following in the track of Demosthenes, took this view of the subject, he employed the Latin word "*actio*" (*action*) to signify not merely gesture, but precisely what we mean by "*delivery*." He says, in his treatise entitled "*Orator*" and addressed to Marcus Brutus,—"*For action is,*

as it were, a *certain eloquence of the body*, since it *consists of voice and motion*.”—“*Est enim actio* (action, that is, delivery) *quasi corporis quædam eloquentia quum constet e voce atque motu.*”* In the third book of his work “*de Oratore*,” he says—“But as to the effectiveness and excellence of *action*, THE VOICE doubtless has the chief rank.”—“*Ad actionis autem usum atque laudem, maximam sine dubio partem VOX obtinet.*”† In this he is followed by Quintilian, who says—“By most persons PRONUNCIATION, (that is, delivery) is called *action*”—“PRONUNTIATIO, a plerisque, *actio* dicitur”—and, after citing the opinion of Cicero, he adds—“one may use either term indiscriminately”—“*utraque appellatione indifferenter uti licet.*”‡

Thus we see that Demosthenes and Cicero and Quintilian, all regarded *action*, or *delivery*

* M. Tullii Ciceronis ad M. Brutum Orator. Cap. xvii. § 55.

† Ciceronis de Oratore Lib. iii. Cap. lx. § 224.

‡ Quintil. Institutionis Orat. Lib. xi. Cap. iii. § 1.

—including in this term the voice, the look, the gesture, “*oculis, voce, gestu*,”* in short, the complete and perfect transcript of thought and passion—as the chief constituent of eloquence. This is, unquestionably, the practical common sense view which has been unconsciously taken by the great mass of mankind in all ages of the world.

But with all our modern discoveries in science—our steamboats, our locomotives, our electric telegraphs, and our chemistry of the sunbeam—we are probably (at least, as it respects effective public speaking,) far behind the ancients in the cultivation of the human voice. And yet there never was a finer field in the world for the successful employment of eloquence than in these United States of America. In the primary assemblies of the people, in the halls of legislation, in our schools, colleges and lyceums, at the bar and in the pulpit, other things being equal, elo-

* *Ciceronis de Oratore Lib. iii. Cap. lvi. § 214.*

quence is emphatically the grand road to the highest honors and the most extensive usefulness.

But alas! how often do we find men of the greatest attainments in literature and science, either wholly or partially disabled by vocal disease; for God's government, in the physical as well as in the moral world, is a government of law, and he who transgresses must abide the penalty.

The clergy—a class of men who occupy the most useful and the most exalted of all professions, who have a higher office than any earthly prince or potentate can give them, that of ambassadors for Christ, and who, in many respects, are the leaders of public opinion—are by no means exempt from this deficiency.

The experience of twenty-three years in the ministry of the gospel—during the earlier part of which, I was a Professor in one of the Theological Seminaries of the Protestant

Episcopal Church—and the opportunities for observation in the East and in the West, at the North and at the South, have only strengthened my convictions that the whole science of elocution is far from receiving, in the course of a liberal education, the high place to which it is justly entitled.

Our young men, after devoting years of hard study to Latin and Greek, and mathematics, and other branches of polite learning, complete their preparatory professional studies, and enter on the great business of their lives—perhaps in the public preaching of the gospel—with little or no acquaintance with vocal physiology ; and unless they have been previously trained to use their respiratory and vocal organs in a healthy and natural manner, and have strengthened them by this practical discipline, the amount of labor which those organs are required to perform is ruinous to the mechanism of the human voice.

The result is, in a multitude of cases, that

men who might be exceedingly useful in the active duties of the ministry—to say nothing of our temples of science, our courts of justice, and all the arenas of popular debate—break down prematurely with pharyngitis or some other variety of vocal disability, partial or total, drop into an untimely grave, or lose years of their valuable lives in seeking the restoration of health.

With the finest of all themes on which to expatiate—the attributes and government of God and the corresponding relations of man—no class of public readers and speakers ought to be so eloquent as the clergy; and yet how often are they justly subject to the reproach of the tragedian, that the minister of Christ delivers truth as if it were fiction, while the actor proclaims fiction as if it were truth. The one preaches his audience to sleep; the other charms and electrifies them by the melody of his intonations, and the intensity with which he identifies himself with

the character, the circumstances, and the passion he is representing.

It has sometimes been objected to the study of elocution, that it is fitted to make artificial readers and speakers. As well might one object to the study of navigation, as fitted to make artificial sailors; or of music to make artificial singers; or of grammar and rhetoric to make artificial composers. Nature without instruction too often degenerates. We see this in the slovenly walk and the stooping attitude of those who have not been properly trained. The reverse we witness in the erect carriage and the firm step of the disciplined soldier. Nor must it be inferred from this that the orator is obliged, during the progress of his discourse, to chain down the soaring energies of his genius, by reverting in his mind to the rules and technicalities either of grammar, or rhetoric, or parliamentary action. That was a part of his preliminary training: it has become in-

woven, as it were, with the very texture of his soul: and, while pouring forth the flood of thought and feeling, he no more stops to think of etymology, and syntax, and prosody, and inflection, and emphasis, and intonation, than the accomplished musician, whose fingers move like lightning over the keys of the piano, stops to think of his elementary solfège amid the applauses of his charmed and delighted hearers.

The orator, like the musician, has previously had the requisite discipline. He surrenders to the thought that is stirring up the innermost depths of his own spirit; he gives involuntarily the practical embodiment to that thought in every look and motion; his voice instinctively assumes the requisite intonation and inflection; and, while retaining his own self-possession and the command of his audience, he first binds them with a spell, and then carries them, where he will, by the irresistible prowess of a cultivated elocution.

It was thus that Demosthenes, when the destinies of his country were trembling in the balance, waked up the mighty heart of the fierce democracy of Athens, and overwhelmed his antagonists by "arguments red hot with passion." The vast multitude were moved, as the forest by the rushing tornado, and with one voice they exclaimed: "Let us march against Philip."

But to return to the work now presented to the public: its object is to give some useful hints to all classes of men—and more especially to the clergy—as it regards the development and physiological use of the respiratory and vocal organs.

| Dr. Guilmette's progressive system, for the scientific education of that part of the human mechanism, is founded upon nature; and the revelations of nature are but the voice of God echoing back the declarations of his word.

We are told on high authority that "the

blood is the life," (Deut. 12 : 23,) but what is it that gives life to the blood ? The air that we breathe ; and accordingly one of the first things that God did, after creating the body of man, was to put breath into it. In the language of the sacred oracles : "The Lord God formed man of the dust of the ground, and *breathed into his nostrils* THE BREATH OF LIFE ; and man became a living soul." (Gen. 2 : 7.)

Now one of the leading principles, to which great prominence is given in Dr. Guilmette's system, is that *voice proper is breath converted into sound* ; and that *the diaphragm, the principal muscle of respiration*, is the grand agent to propel the vocal pulmonic stream.

Hence, other things being equal, the more breath one has, and the more diaphragmatic strength, so much the more power of voice.

The agency of the diaphragm in respiration was strikingly illustrated at the Bellevue

Hospital, in the practice of an eminent New-York physician, Professor Fordyce Barker, M.D.

It was in the case of a woman, who died from difficulty of breathing. Dr. Barker, after careful investigation, had affirmed that the diaphragm was completely blocked up against the lungs, and had no space to perform its appropriate functions.* The *post mortem* examination showed the accuracy of his diagnosis.

But although the diaphragm is the *principal* muscle of respiration, the abdominal, dorsal, pectoral, and costal muscles, are auxiliaries; and in the opinion of Dr. Guilmette, if one of the attendants had alternately pressed and relaxed the ribs of the patient, there might have been kept in

* This obstruction to the diaphragm occurred during the last stages of gestation, and was caused by extreme distension of one of the chief organs of the abdominal viscera.

the body breath enough to prolong its life until relief could be afforded by a surgical operation. The physician left the room, for a moment, to get the requisite instrument; but when he returned, the woman was dead.*

Of the *vocal cord theory*, which has been so extensively prevalent, we find the following important account in Colombat De L'Isère's valuable treatise on the diseases and hygiene of the organs of the voice.

"In 1742 *Ferrein* decided that the larynx was an instrument with strings, and compared it to a violin. This opinion made

* On the 30th of May, 1860, I addressed a note to Professor Barker, enclosing the above statement of the case at the Bellevue Hospital, and the next morning received the following answer, containing his voucher for the accuracy of that statement, and his kind permission for its publication :

DEAR SIR : I have only time to say that I believe the statement of facts to be correct, and I have no objection to its being published. Very truly yours,

FORDYCE BARKER.

Rev. EDWARD WINTHROP.

much noise at the time, and received an almost general assent, which it was certainly very far from deserving. This learned man compared the ligaments of the glottis to the strings of a violin, and gave them the name of *vocal cords*. The current of air was the bow; the thyroid cartilages, the points of support; the arytenoid, the pegs; and finally the muscles which are inserted in them, the powers designed to stretch or relax the cords."*

* "En 1742, *Ferrein* voulut que le larynx fût un instrument à cordes, et le compara à un violon. Cette opinion fit alors beaucoup de bruit, et reçut un assentiment presque général, qu'elle était certainement bien loin de mériter. Ce savant comparait les ligamens de la glotte aux cordes d'un violon, et leur donna le nom de *cordes vocales*. Le courant d'air était l'archet; les cartilages thyroïdes, les points d'appui; les arythénoïdes, les chevilles; et enfin les muscles qui s'y insèrent, les puissances destinées à tendre ou à relâcher les cordes."

Maladies de la voix, par Colombat De L'Isère. Paris, 1834. 8vo, pp. 50, 51.

J. F. W. Lane, M.D., has translated the greater part of this work into English. The first edition of his translation, (A.D.

With the great Colombat De L'Isère, Dr. Guilmette discards the theory that voice proper is produced by the so-called vocal cords. This theory may be disproved by actual experiment: for one may bring into full play all the vocal muscles, and direct the pulmonic stream with the utmost force possible against the vocal ligaments, and yet at the same time so entirely suspend the voice proper, that, from the lowest to the highest intonation, nothing shall be heard but a whisper, whether percussive or prolonged. This, most assuredly, would not be so, if the larynx were an instrument with musical strings, and the vocal ligaments, when swept by the current of air, were analogous to the cords of a violin.

The theory is also extremely pernicious, for it has a tendency to bring on physical

1845,) was published by Otis, Broaders & Co. Boston, 1 vol. 18mo. The second edition, (A.D. 1857,) was by Redding & Co., No. 8 State street, Boston, 18mo.

disease by concentrating the mind on the throat, *instead of fixing it on the diaphragm as the grand propelling agent.*

According to Dr. Guilmette's philosophy of the voice, the breath, rendered vocal, is expelled from its reservoirs, the lungs, by the diaphragm and auxiliary muscles. It then traverses the entire isthmus of the throat, namely, the bronchi and the trachea, and after passing the laryngeal chamber is accumulated in the concavity of the epiglottis or valve of the larynx proper. This pulmonic stream—which, from its first point of departure, that is, from its very starting-point in the lungs, has been made vocal by the mucous membranes under the influence of those nerves from which they derive their mobility and sensibility—is next radiated by the epi-glottis to the posterior wall of the pharynx; proceeds to the soft veil of the palate; and, finally, passes over the entire surface of the chamber of the mouth, and

issues through the lips, if the latter be open, or if they be closed, the column is driven into the nasal cavities, till it finds its exit, after reverberating, more or less, over every sinus of the face and skull.

Agreeably to this philosophy, while one is speaking or singing, there should be comparatively but little muscular action of the throat, no more than is absolutely necessary for intonation, that is, for the production of acute or grave sounds; the trunk should be erect; the shoulders thrown back; the neck straight and uncompressed, and if turned either to the right or left, the body also should be turned at the same time, and in the same direction, so as to avoid stricture of the vocal tube; the anterior wall of the chest should be elevated; the ribs expanded; the lungs well supplied with air; the upper and lower jaw sufficiently separated from each other, in order to prevent the sound from becoming nasal; the vowels carefully

moulded ; the consonants distinctly articulated ; free play given to the diaphragm ; and the apex of the vocal stream so directed as to skim gently over the soft palate, strike with its force against the hard roof of the mouth, and reverberate to the very orifice of the lips.

Thus we return to nature : and the throat receives no more injury, in its strictly physiological or healthy use, than the pipe of a bellows from a steady column of air.

Let these principles of vocalization be thoroughly carried out, and the general laws of hygiene at the same time faithfully observed, and we shall hear less of sore throats, inflamed lungs, diseased stomachs, paralyzed nerves, and disabled voices. Public speaking will be an agreeable exercise to those who are properly trained, and will conduce to their vigorous health.

EDWARD WINTHROP.

June 2nd, 1860.

LECTURE FIRST.

RESPIRATION,

AS PERTAINING TO

VOICE AND HEALTH.

PART FIRST.

When we consider what numberless interests depend for their promotion upon the instrumentality of the human voice, how sacred, how exalted becomes this faculty, how important every truth that concerns its health and promotion!

Every one, doubtless, has at some time or other been made sensible how much of soul-stirring power can be communicated by the tones of the human voice alone, whether employed in the service of speech or of song. The infant readily appropriates the animus of the tone, ere it can comprehend the meaning of the words uttered by the mother. The lower animals may be repulsed, or won, or otherwise governed, by an adroit modifica-

tion of the tones of the voice. And if we ascend, and borrow from the sanctuary of reciprocal human affection, we can appeal to the experience of many to bear witness that it is not so much in the words, however intense their meaning, as in the tone in which they are conveyed, that the heart's utterings are truthfully recognized. How important, then, that an instrument, capable of being the eloquent exponent of our deepest and most uncommunicable emotions, should be understood by us, in all that relates to its formation and health, even to its most refined and skillful culture. That the acquirement of such knowledge is a moral duty, would seem evident from the fact that the Creator has so intimately connected the mechanism of the voice with the most vital portions of our animal structure, as even to render pleasurable existence, in a measure, dependent upon the degree of protection we afford this distinguishing faculty.

It had been equally easy with Him, the All-wise, to have produced this wonderful phenomenon, the human voice, by some peculiar motion of our external members—of our arms, our ears, or our fingers—that so we might have escaped the mortal penalty that now attends an undue neglect or

abuse of our vocal organs. In constituting the most vital functions its producers, we may recognize the teaching, that the human voice—thus proceeding from the very seat of life—is designed to be life-giving in its exercise, and that it is to cease from its beneficent office only with life itself!

The plan of the present address will be to show,—

1st. The urgent necessity now existing of a more accurate and practical acquaintance with the philosophy of the voice, and of vocal hygiene; and,—

2d. To expose some important popular errors regarding these two points.

With such an array of living evidences of the first proposition as surround us, I have but to appeal to observation in its support. Even the pulpits of our cities and larger towns, where the science of vocal physiology should be best understood, contribute more than their share of testimony to the alarming ignorance that prevails concerning this most important subject. If—as is the fact—the voice, like the muscles of the limbs, accumulates strength and capacity by

repeated rightful exercises, why is it that among the clergy, who enjoy such enlarged facilities for this exercise, so many, especially of the younger members, are vocally considered, according to St. Paul, "in speech contemptible,"—and, as a matter of course, in health puny? Why do so many totally break down under what is termed the "labor" of their public ministrations; that "labor" which, if rightfully performed, would rather be a luxury to them, and, withal, recuperative in its reaction? Many errors in their individual mode of life, affecting the health of the vocal apparatus, might be recited, as lending a probable secondary agency in bringing about these results; but I prefer to answer the question by citing the great radical first cause, namely, that it is because there are no "Professors of Vocal Physiology" connected with the educational institutions of our country. There are no truly philosophic and well-digested treatises upon the natural mechanism and governing laws of the vocal organism extant, or adapted as hand-books for the general student. True, there are Professors of Elocution, competent to show us how, in uttering any given sentiment, the voice may be best invested. But elocutionary skill

alone does not supply the want in question; for, if we have no voice to invest, this department of art but serves to render our vocal deficiencies the more apparent. We have also, for musical students, books that are termed "Vocal Instructors;" but as these are founded mainly upon traditional precepts, and upon an imitative process, rather than upon any well-defined physiological or anatomical knowledge, the benefits to be derived from them are confined principally to such as possess naturally well-developed voices. It is to be presumed that most theological students acquire, in the course of their primary education, a tolerable knowledge of animal physiology; yet it is a part of my purpose to demonstrate that even this may consist with misapprehension, amounting, in some instances, to fatal ignorance of the laws that govern the vocal phenomena. This I hope to render apparent when treating of the second proposition of this address.

In final reference to the vocal disabilities of clergymen, I would remark that whatever may be their presumed or assumed knowledge of the subject, the fact yet remains to be accounted for, that so many of them continue to be afflicted with

weakness of the vocal organs, sore throat, general debility, and partial or total loss of voice.

A glance among other public speakers discovers the same endemic also strangely prevailing. How many learned men there are at the present day, who, by their eminent virtues and natural and acquired attainments, are peculiarly fitted to become leaders of public opinion, and "stirrers up of the people," on public occasions, to wise policy and noble deeds, yet for lack of "sufficient voice to fill the house," or "the space," are compelled, on such occasions, to reserve their influence for the benefit of a limited circle. I have myself repeatedly witnessed the painful efforts of some such gentlemen at important public meetings; and I have observed, on these occasions, that the mass of the people were disposed to be governed by the sentiments of him who possessed the strongest and most melodious voice, and who spoke, consequently, with most ease and efficiency. It is natural to mankind, especially the more unreflecting portion of them, to be more easily swayed by popular eloquence than by sound reasoning. Now, if much that passes for eloquence at the present day could be chemically analyzed, I venture to affirm that four fifths of its

constituents would be found to be pure, strong, flexible, vocal sound.

But we are not dependent alone upon the ranks of public speakers for evidence of the ignorance that generally prevails regarding the laws of the health of the voice. We have but to enquire of our next-door neighbor, and, if not himself a victim to vocal disability, he will cite some person in the immediate circle of his friends who belongs to that class of sufferers; and he will probably relate a marvellous circumstance connected with this friend's case, to the effect that even after a doctor had burnt up the mucous lining of his throat with nitrate of silver, and had taken out both tonsils and a portion of his uvula, he still complained of not being whole and vocally sound! Ungrateful patient! We verily believe that were he crippled by "swelled joints," and we should kindly undertake his cure by cutting off both his legs, and perhaps an arm or two, he would, even after such thorough extirpation of his complaint, continue to imagine himself crippled—so obtuse are some people!

Indeed, there is hardly occasion for searching for such cases: they present themselves spontaneously on every side. I think I may safely assert, that

few are to be found who cannot recall to mind some individual acquaintance who has been incapacitated for many important duties by reason of some disease of the throat or lungs, that is gradually destroying his vital energies, and is rendering his life more and more a weariness and a burden.

I have frequently heard the universality of throat and lung diseases in this country charged upon the climate—"its constant and extreme changes," &c. For my own part, I consider this charge an ignorant and most ungrateful libel upon as fine and invigorating an atmosphere as Divine Beneficence has anywhere prepared for the sustenance of man. Where upon the globe will you find, physically speaking, a more magnificent and robust race of men than were the North American Indians in their palmy days? No;—let us not sin against physical law, and charge our delinquencies upon God's providence! He has created the sun to vitalize all things. Let not him who, through his own indiscretions, has weakened his eyes, curse God's glorious sunlight because it is the occasion to him of visual pain!

It is rather to our inversion of certain physical laws, or, more radically speaking, to our ignorance

of such laws, that the prevalence of these ills is to be attributed. And this introduces me to the second purpose of my address.

PART SECOND.

An expose of certain popular errors concerning the Seat of Voice, or Vocal Phonation; and the laws that govern the Health of the Voice, as well as its development.

Whatever of progressive discovery has been made in other departments of medical science, it is quite certain, that that of Vocal Pathology remains unillumed by any well-defined and established theory. I attribute the reserve of medical authorities on this important subject to an original misconception of the anatomical machinery of the voice, and its proper functioning for the production of vocal phenomena. Any error on this point

will of course generate confusion and uncertainty in all methods of vocal treatment or development.

It has also been offered in apology for the uncertainty that shrouds this question, that "Physicians are not Vocalists, and Vocal Teachers are not Physicians." How much this divorce of the two arts may contribute to a continuance of the evil, it may not become me, perhaps, to assert; but one thing is obvious to the medical student, and that is, that there is not an instance on record of any physiologist having practiced upon himself the full development of the machinery that constitutes his vocal instrument;—and yet, it was not until after prolonged and most thorough experiments of this nature, that the writer was enabled to obtain a demonstrative solution of the most simple questions regarding Vocal Hygiene.

- In my position as medical counsel to several opera companies, in this country and in Europe, I have been afforded ample evidence both of the fallacy, and, also, of the mischievous tendency, of many of the popular notions regarding vocal education and treatment, springing from the baseless sources to which I have alluded.

The theory which generally prevails regarding

the vocal mechanism is, that it is embraced in the lungs and the larynx. Some, more observant and studious, have admitted the diaphragm also into this co-partnership. So that the complete popular idea of the production of the voice is this: The lungs act as the bellows, which are moved by the diaphragm, and force the air through the glottis, or aperture of the larynx, or upper portion of the windpipe. The air striking against the edges of this aperture,—which edges, in support of this theory, have been denominated “vocal cords,”—the air, by thus striking the edges of the glottis, causes those ligamentous “vocal cords” to vibrate, and hence the production of vocal tone,—the gravity or acuteness of the sound being governed by the degree of tension we give to the so-called “vocal cords.”

Now this theory appears very plausible, and even philosophic, until the test of stern experiment discovers its fallaciousness and absurdity. When we remember that the conditions essential to the sonorous vibrations of a cord are liberty of motion, connection with a sonorous body, dryness, tension, elasticity, arbitrary length, and consistence, and that none of these conditions exist in the so-

called "vocal cords," we must characterize this theory as absurd; but actual experiment has proven that the highest quality of sound that can be produced by thus pressing the air through the glottis is a whistling, similar to that produced by the lips. To confirm this assertion, I will now call into exercise these limited portions of the vocal machinery,—that is to say, the lungs, the diaphragm, and the glottis,—and we shall see what character of sound can be produced by their agency alone. I shall give these members the utmost play they are capable of exercising,—at least, in my person; and you will perceive by the powerful column of air expired, and by the various intonations it assumes, that I offer no impediment to the operations of the diaphragm and lungs, or to the expansive and contractile powers assumed for the so-called "vocal cords." [EXPERIMENT.—*Here the lecturer executed several popular airs in a whispered tone; in other words, voice proper was entirely suspended. The philosophy of this phenomenon is, that the entire vocal and respiratory organs may be brought into play powerfully; and if the membranes of the inner tubulated vocal parts be not contracted or tightened, physiologically, on the*

principle of a drum-head, we can have no voice proper. Hence, the seat of phonation is mucous membrane; and what sheepskin is to a drum, so membrane is to the vocal instrument.]

You see by this experiment that if we had no more organ of voice than this theory,—popular even with medical men,—vouchsafes us, we should be in a bad plight. The evil resulting from this deep-rooted notion of the philosophy of the voice is manifold in its development, and of fatal tendency; for, as the organs of the human body can only be fully, and, I may add, safely expanded by certain exercises based on physiological principles, or, in technical phrase, upon the natural functioning of the parts, it follows, that if we attempt to exact of these organs or parts, services in a manner or character contrary to those which by nature they are designed to render, we weaken and destroy rather than expand these same parts, by every such false exercise of them.

To apply this axiom to the subject in hand. A generally received opinion teaches us that the voice has its seat or formative source in the larynx, or upper part of the windpipe. Consequently, when we speak or sing, the mind, in its supervisory ac-

tion, associates the effort with the muscular energies of the throat, and is therefore continually exacting of those muscles what they are totally unfitted by nature to produce, viz., vocal tune. Here, then, all unconsciously to us, but none the less real nevertheless, is an unnatural action excited of one of the most frail and sensitive portions of our animal structure,—parts which, through their mucous tissue or covering, sustain sympathetic relationship to the immediate organs of life and to the nervous system generally. Of course, if this unnatural action be oft repeated, long sustained, or intensified on any given occasion, inflammation, or rupture, follows as a consequence.

The speaker or singer becomes sensible of hoarseness and nervous exhaustion. Inability to increase the power of his voice or to use it for any length of time, with dryness and soreness of the throat, together with what is termed catarrh, swelling of the glands of the throat, dyspepsia, bronchitis, and finally consumption, are all natural consequences of this same and now almost universal unnatural action.

But other evils spring from this ignorance regarding the physiology of the voice; evils quite

as momentous, from the deteriorating influence they also exert upon general health and longevity. These evils consist in a consequent neglect of a proper education of the respiratory organs; or, in common parlance, the breathing machinery, upon which the true theory of the vocal phenomena is based.

Before commenting upon this interesting department of my subject, it will be necessary for me to enumerate the several organs which careful investigation has discovered participate in, and are essential to, the production of the human voice. The precise agency which each of these organs lends in contributing to the grand result, constitutes an appropriate and interesting inquiry to the student in vocal physiology. It will not be expected that I should enter upon it here. The organs constituting and belonging to the vocal instrument are, the lungs the muscles of respiration, the chest, the trachea and bronchi, the larynx, the pharynx, the veil of the palate, the uvula, the tonsils, the epiglottis, the palatine arch, the nasal cavities, the maxillary sinuses, the tongue, the cheeks, the lips, and, finally and most important, that delicate tissue or mucous lining which covers all these organs.

To resume the subject of the respiratory mechanism. It may sound strange to your ears when I declare that among the rudimental sciences that should be taught in every family and school is the science of breathing. Were but even the rudiments of this science more generally understood, a multitude of diseases that are now afflicting and disabling such numbers of our countrymen and women would eventually disappear. Instead of the pale faces, the lean persons, and the husky or feeble voices that now greet us on every side, the community would once more assume the robust forms, the ruddy complexions, the clear, ringing tones of by-gone days—ere the sanction of custom and the seductions of luxury had practically subverted the respiratory laws.

When we thoroughly understand how good blood and its healthy circulation in the body are dependent upon the proper respiration of pure air, we shall be more careful to maintain that respiration under all circumstances, at any sacrifice of momentary ease or pleasure. Although, as we are aware, the substance or basis of the blood is elaborated in the stomach and intestines originally from the food, yet it does not seem practically to be

borne in mind that it is from the air with which it is brought in contact in the lungs that its fitness and adaptation for the support of life are derived. If the blood should return from the lungs into the general circulation in the same state in which it entered the lungs,—that is, if there were no air in the lungs to come in contact with the blood,—death would be the consequence. The eminent physician, Bichat, demonstrated this well-attested fact by an experiment upon a couple of dogs. He connected the jugular vein (the vessel that returns the blood from the head on its passage back to the lungs) of one dog with the carotid artery (the vessel which sends the arterial or perfected blood to the brain) of another by means of a tube, and allowed the venous or unperfected blood to flow into it. The result was, that the dog in whose brain the venous blood was made to circulate became insensible, and would shortly have died. On allowing the arterial blood again to circulate, the dog was restored.

In a word, venous blood is unfit to sustain life because it has lost properties of nutrition which it originally acquired from the air. Hence we find it on its way back to the lungs for re-vitalization by the air; and hence, if air be excluded from the

lungs, as in cases of hanging or drowning, death follows. If this exclusion of the air be but partial,—as when people suffer their lungs to become contracted from neglect of proper culture, or from the use of a vitiated atmosphere,—then death will be lingering, leaving its traces of impoverished blood in the pallor and blueness of the skin, in general debility, in an ulcerated throat and lungs, and in other manifestations of decay.

As the blood, so to speak, is a magazine of elements which are destined, through the process of the secretions, to repair the continual waste of every part of the body, it follows that if there is a deficiency of any one of these elements of procreation in the blood, the repairs of the body cannot go forward for want of material. The resisting and recuperative forces of animal life are diminished, and dissolution, more or less speedy, is the natural consequence.

“In 1851, Dr. Cartwright, of New Orleans, in the presence of eminent physicians and other scientific persons, resuscitated an alligator which had been killed by tying the trachea. After an hour, when neither fire nor the dissecting knife produced signs of pain, Dr. Dowler laid bare the lungs and

the heart. Then a hole was cut in the trachea, below the ligature, and a blow-pipe was introduced, which Professor Forshey worked with violence. At length a faint quivering of moving blood was seen in the diaphanous veins of the lungs. The inflation process being continued, the blood next began to run in streams from the lungs into the quiescent heart. The heart began first to quiver, then to pulsate, and, signs of life elsewhere appearing, the animal began to move; and soon, strong men could not hold him. Again they bound him to the table, and kept the trachea tied until life was apparently extinct, when, again inflating his lungs, he so thoroughly revived that he became dangerous, snapping at everything, and breaking his cords. For the third time the trachea was ligatured. The animal expired, and was resuscitated."

Dr. Ely, of New Orleans, was one who had opposed and written against the theory of "circulation dependent upon respiration"—an all-important discovery made by the distinguished authoress, Emma Willard. "In the meantime his infant son had cholera, and expired. His medical friends had left him, and crape was tied to the handle of the front door. Standing by the side of his lifeless

babe, Dr. Ely said to himself, 'If this theory should be true, I might yet save my child;' and, profiting by the example of Dr. Cartwright, in restoring the dead alligator, he restored his child to life. Remitting his efforts too soon, again the infant ceased to breathe. And again, and yet the third time, the father restored him—when the resuscitation proved complete; and months after, the child was living and in perfect health. Dr. Ely then came promptly forward, and, like a nobly honest man, reported the case as convincing evidence of a truth which he had formerly opposed."—*See Theory of Circulation by Respiration. Synopsis of its Principles and History. By Emma Willard.*

Were these and kindred facts regarding the philosophy of respiration generally understood, methinks we could hardly expect to find, as we now do, so many individuals, in every class of society, who are utterly reckless of the condition of their respiratory organs,—not only neglecting all systematic culture, or expansion of their respiratory mechanism, but even impeding, by preposterous habits, what little of healthy natural action their vocal and breathing apparatus may be capable of! Thus we find clergymen, and other professional

gentlemen, pursuing their studies in close, ill-ventilated apartments, and in cramped positions of the chest; and, instead of resorting to the most natural method for arresting the destruction that is being wrought in them by these imprudences, we find them in some instances racking their enfeebled limbs by a violent use of the "dumb bells," as if such a process could meet the claims of weakened lungs and vitiated blood! The natural aliment of the lungs is pure air, of which they can hardly have enough. They are capable of gradual enlargement and expansion; but this expansion can only be directly wrought by deep, healthy inspirations of air, conducted upon physiological principles,—a mode of inspiration that differs very materially from that ordinary operation which we term "breathing."

All the mere enlargement of chest which can be obtained by any muscular stretching can never improve the size or the health of the lungs, which, like the withered kernel within a sound nut-shell, may be totally diseased and shrivelled, notwithstanding this outward appearance of size and vigor. A large chest does not necessarily imply large lungs; so that he who in this manner attempts to

extract blood from dumb-bells will find, when fatally too late, the means inadequate to the end. I do not mean to deny that certain benefit may be derived from a judicious use of the dumb-bells, but only to assert that mere muscular exercise alone is incapable of supplying that specific aid which a system, impoverished and debilitated through neglect of the proper employment of the respiratory organs, imperatively demands.

And if such recklessness regarding the health of the respiratory organs is exhibited by those who are reputedly learned, we must not be surprised to see ignorance of the subject pervading the community generally. Thus we find females remaining a great part of their lives housed, and a large portion of each year in heated apartments, seated in low and stuffed chairs, their chests and lungs restricted and cramped by the weight of the superincumbent shoulders, as they sit nearly doubled up over their needle-work or books. Can we wonder, after intelligently considering such habits, why it is, that whereas in England and other countries in which ladies take vigorous out-door exercise,—and by such exercise I do not mean merely what is daintily termed “fashionable promenades,”—woman is

in her prime at forty; yet in this country, with the advantages of a superior climate, she wilts and succumbs almost at the expiration of the teens? And what are the counteractants we employ for the lassitude and nervous irritability experienced from thus obstructing the full play of the respiratory mechanism, and depriving our lungs of a sufficiency of fresh air? A languid stroll down Broadway, perhaps, if the weather is precisely accommodating; if not, we wait until evening, and then we suffer ourselves to be packed in a close carriage or omnibus, and rolled to a crowded theatre or concert-room, where the air is even more vitiated than in our own apartments. Or, it may be, we extemporize a ball or a concert in our own drawing-rooms. In either of these latter cases, the poor, weakened, and, it may be, already diseased lungs, heart, and other viscera, are subjected to a species of violent exercise for which they have never been suitably trained, and which they are not in a condition to sustain or undergo.

Another destructive agency which we daily take to our embraces, is the unnatural labor and excitements, by abstinence and surfeits, to which we subject our digestive organs, which organs, it

should be remembered, are equally dependent for their vigor upon proper habits of respiration. We eat, or, more literally speaking, bolt, our food at irregular and unseasonable intervals.

In all these means of physical recreation to which we resort, not the slightest intelligence touching our needs and infirmities, is apparent. We lay blindly about us for some relief that will satisfy the vague cravings of an impoverished animal nature; and unfortunately, seize only that which is calculated to promote, rather than diminish, the difficulty. Is it not evident then, that the public mind requires to be systematically enlightened on a matter of such absorbing consequence as this?

In citing the daily habits of a large proportion of the female members of our communities, I have, doubtless, recalled to your minds similar fatal habits practised by multitudes of the opposite sex, who are engaged in mercantile and commercial pursuits. Nor is the evil restricted even here. The poor children,—who from their tender years are necessarily dependent for guidance upon the maturer wisdom of their parents or teachers—are crowded together in apartments that in many cases

are intolerable, for want of certain cheap appliances to promote suitable ventilation.

Without discussing the wisdom of a custom that taxes the brain of a child with mental effort,—for two or more consecutive hours,—unrelieved by those intervals of active motion in the open air, and which nature teaches us are essential at this period of life to future physical and mental health,—I content myself at this time by simply noting the fact, that although the wasted forms, the pallor and languor that characterize school children,—especially the female portion of them,—have moved our modern philosophy to some grateful modifications of the mode and formulas of juvenile education; yet, the grand cause of these alarming symptoms remain undiscovered! That cause I have no hesitation in assigning to a lack of suitable education of the respiratory organs.

We all know that children require to be instructed in the proper use of every bodily and intellectual faculty; and is it not surprising, that possible deficiency in the art of breathing should never enter into the imaginations even of professed physiologists? We require the aid of art and constant effort to keep us from relapsing into uncouth

bodily habits, which are most under our observation and control. Not one in ten of our race can walk gracefully, until carefully instructed. It is only art and constant effort that keeps us from talking through our noses, druling at our mouths, or peeping through our uncombed and animative hair.

Is it to be expected then, that submitted, as they constantly are, to opposing influences, the respiratory organs will accomplish their full vocation without proper attention on our part? And certainly, we are not likely to bestow such attention so long as we are kept in ignorance of the organization and true functioning of these complex organs!

In the earlier days, when men and women carried themselves physically as well as morally upright,—when rugged exercise in the open air impelled a freer, deeper and more natural respiration, ere the air of sitting and sleeping apartments and counting-rooms was deprived of vitality by the insatiable repacity of anthracite-coal-fires and red-hot stoves, and was not filled with an impalpable, invisible, yet irritating dust arising therefrom, nor the insidious poison from gas-pipe leakage,—when people went to bed at reasonable hours and arose

at the same,—before toil was made a task, and amusement a toil,—when they ate regularly, and at seasonable hours, of wholesome and substantial food, and regaled themselves in their homes with a sincere, reverential, loving, filial and social intercourse—then—what then? Why, then *people lived all their days!*—Do not smile as if this were an impotent conclusion to bring this example to. If you would acknowledge its force, contrast it with the fruits of present social life; when *people die all their days!* You will doubtless obtain a clearer conception of the importance of this subject of respiratory education, by considering for a few moments the offices and operations of some of the organs which I have named as constituting the vocal mechanism.

The lungs, as you are aware, are composed of minute ramifications of blood-vessels, air-cells, and nerves. They are suspended, as it were, in the chest, by the trachea or windpipe, and are also attached to the heart by the pulmonary vessels. The pulmonary artery carries the venous blood—which we have already proven to be unfit to sustain life—from the heart through them, to subject it to the action of the air in their cellular struc-

ture. After this action or arterialization has been accomplished, the blood is returned to the left auricle of the heart, and by that into systemic circulation. The air is supplied through the windpipe and the two bronchi into which the windpipe branches, and is diffused throughout the lungs by minute and innumerable ramifications of the bronchial tubes.

The air acts upon the blood in the lungs through a wonderfully thin membrane, which is estimated to be not more than from 1-70 to the 12-100 part of an inch in thickness! If we tie up tightly in a bladder, a quantity of venous blood,—which is dark purple in color,—we shall find that in a short time that portion of the fluid which is nearest the surface of the bladder, has undergone a change. The air has passed through the bladder and has converted the venous into red or arterial blood. This is precisely the change that is wrought, only instantaneously wrought, by reason of the thinness of the membrane, and the ramification of the vessels in the lungs. Connected with this result is another, equally worthy of note. It is this: that whereas, the air has rendered the blood fit to sustain life, it has by that operation deprived itself of

its life giving properties, and is no longer fit for respiration.

Fresh supplies of air then, in order to the production of pure blood, is an essential object of the respiratory apparatus. It is estimated that an ordinary laboring man consumes between 3 and 4,000 gallons of air per day. If this quantity is essential to vigorous life in one instance, it is also in all; although the lungs and heart of a coal-heaver are much larger and healthier than those of a person of sedentary or inactive habits; because his employment requires him to bring into play every muscle which is capable of assisting the respiratory mechanism, he consequently takes in a larger quantity of air. He enjoys vigorous health.

The unfortunate sedentary individual, on the contrary, by a cramped or indolent positioning of certain parts of the body, limits the respiratory mechanism to a very contracted and feeble action, barely sufficient for existence—certainly not calculated very greatly to prolong it. Hence there is pressing need on his part that he should educate his respiratory muscles by proper daily training, until they habitually contribute their full capacity of air to the lungs.

The provisions which the Creator has made to compel, in some degree, the inflation of the lungs with air, are as simple as they are marvelous. The cavity of the chest in which the lungs, so to speak, hang suspended, is, as is popularly termed, "air tight;" in other words, no air is permitted within it. In the process of inspiration, or drawing in the air, this cavity is more or less enlarged as the laws of inspiration are more or less correctly obeyed—by elevating the ribs, which are provided with elastic muscles for this purpose, and by depressing the diaphragm. Now, then, as "nature abhors a vacuum," this enlarged cavity must instantly be filled. Consequently, if the windpipe of the individual remains open and unobstructed, as we will suppose by a halter or any other unnatural impediment, the air rushes through it into the air tubes and vesicles of the lungs, and blows them up as we might blow a bladder.

The air having performed its appropriate service in the lungs, and become unfitted for further use, must be expelled in order to admit a fresh supply. This important reaction is accomplished, first by relaxing the tension of the muscles by which the ribs had been previously raised, and next, at the

same instant, by contracting the muscles of the abdomen; through which contraction the diaphragm is pushed upwards, and thus, the decomposed air in the lungs is expelled. This counter-action is called expiration.

Ordinary inspiration involves only a slight contraction of the diaphragm and enlargement of the chest; but healthy deep inspiration requires the employment of additional muscles. The deeper the inspiration, the greater is the descent of the heart as well as the lungs—consequently the healthier is the functioning of the heart. It is proper to remark that the same affluence of benevolence and consummate forethought that characterizes all the works of the Creator, is also present in this important mechanism; for, when respiration is in danger, by the arrested play of one group of muscles, others are ready to assume their action and office immediately.

One fact connected with respiratory motion is particularly worthy of note; that whereas the motions of the heart and intestines are entirely involuntary—hardly producing a consciousness within us of their existence—those of respiration, on the contrary, are accompanied by a sensation, if not

also an act of volition. As if to remind us that this portion of the vital machinery, which is, in fact, the mainspring of the whole, is entrusted to our own hands; in order that we may enjoy just as much of animal life and vigor as we choose; and have nobody to blame but ourselves, if we do not attain to our full capacity for happiness, usefulness and longevity, in this much-abused stage of our existence.

I trust that by this general sketch of the office and operations of the respiratory organs, I have convinced you of the truth of one of my principal propositions: that ignorance regarding the physiology of the voice has led to momentous evils arising from a consequent neglect of the due cultivation of our respiratory capacity. Now in order to apply these remarks to the practical benefit of my hearers, allow me to suggest a few homely rules for your daily government.

When you arise in the morning, throw open the casement of your sleeping apartment, and regale yourself with a glorious repast of the fresh morning air. Sip it in gradually and quietly, until every little air vesicle in the lungs is awakened from in-anition by the unexpected presence of the rare

luxury. Take your time, and do not be stingy in the number of your doses. Repeat this life-giving exercise every night before retiring, and at regular prescribed intervals during the day.

Avoid, as much as possible, over-heated, confined, and impure atmospheres. When you sew, or write, or read, let your hands be nearly horizontal with your chin, in order to avoid the deadly influences of a drooping chest. Ever preserve an erect position of the body,—with the chest thrown forward and the shoulders back,—whether you sit or stand, or even stoop. Do not impede the free action of the ribs by tight-lacing or dressing. Use systematic exercise, daily, in the open air. Read some work on human physiology and the natural functions of the body; which you may study evenings, if your eyes are not weak, until half-past ten; never later, for then you take your lung-bath and retire. Should you systematically retire earlier than this, you would not be a loser by such a habit, in any sense. Nothing exhausts the nervous energy more rapidly than late hours, and midnight excitements. Be regular in your meals, at intervals not exceeding five hours of abstinence. Let your food be of the substantial, rather than of the

wishy-washy, whipt-syllabub class. It should be easy for your digestion, and be taken warm.

When you read aloud, or speak, or sing, see that you do not employ any muscular effort of the throat in the exercise, under the mistaken idea that power of voice, or even voice itself, is produced by such wear and tear of those organs. If you have already injured your voice by this false method, be careful how you dose, or how you maim or burn those delicate parts, under the vain expectation that you can recover your voice by such unnatural processes.

See that your children are duly instructed in the proper use of their respiratory organs. Let active play in the open air alternate at short intervals with their studies; and in all respects inculcate upon them the same proper rules which you observe for the maintenance of a vigorous physical life.

Let these few simple rules be practiced upon daily by ourselves, and by our children, and we should soon hear no more of dyspepsia, of palpitation of the heart, of weakness of the lungs, and of sore throats; but society, relieved of the fumes from distempered stomachs, and the dark imaginings, evil surmisings, envyings, broodings, fore-

bodings, irritability, and other concomitants of disordered nerves and impoverished blood, would wear upon its unclouded brow the sunshine of tranquil happiness and an unfeigned sympathy.

With our present unstrung animal organizations restored to tune and concert-pitch, we should become more in harmony with the bright, lovely, and loving universe of God; the higher emotions of our nature, that so oft become chill and torpid in a low degree of animal vigor, warm under an excess of animal spirits, and flow in streams of generous sympathy.

If we would elevate the tone of public morals in a community, we should regard as a means adapted to the end, the promotion of the physical health and comfort of that community. Christ prepared the way for the inculcation of His divine precepts, by feeding the multitude and "healing all manner of their diseases." We may talk as we will of the achievements of genius and the executive force of talents, and, after all, the fact remains, that those who have achieved and accomplished the most in their different spheres of action in this world, have been those who have possessed

the greatest amount of animal vigor, or physical endurance.

Of what avail, for executive purposes, is genius to its enfeebled and emaciated possessor?

I confidently assert, that just in proportion as the tide of animal health ebbs and flows in an individual, does that individual lose or regain the full use of his intellectual faculties; so that we utter neither truism nor pun when we say, that a man in feeble health is not a whole man. He may be half, or two-thirds, as the case may be; but it is quite certain that he is not fully up to par value, in any sense of the word.

Vigorous health then predisposes individuals and communities to generous action. It opens up all the fountains of sympathy; quickens the higher sensibilities and perceptions, and enables men to weigh more fairly the claims of philanthropy, of justice and religion. Sustained by that flow of natural spirits that arises from a due observance of the laws of health, we experience less craving for artificial stimulus or childish amusements. Our vigorous intellects demand something wherewith to exercise their reasoning faculties. Thinking deeply, patiently, and logically, upon a given sub-

ject, no longer becomes an irksome duty to be delegated to newspaper writers, or yielded to the first declaimer who gains access to our ears. In the exercise of free and independent thought, we are emancipated from the meshes of selfish politicians, and the doctrines of false teachers; and we stand erect amid the sunlight of God's truth, surveying the grandeur of our destiny and the awfulness of our responsibilities.

I do not magnify the blessed results of sound physical health. They flow from that law of completeness and benevolence that governs every operation of the Divine will. Just as surely as observance of the moral law tends to spiritual happiness and perfection, does the observance of the laws of animal health lead to physical happiness and perfection; and we have just the same right to violate the one code as the other—seeing that both proceed from the same Lawgiver.

Let us then, as we venerate the authority of the Great Parent, henceforth endeavor that His benevolent purposes in our animal organization shall be no longer impeded by criminal ignorance, indolence, or neglect on our part.

LECTURE SECOND.

THE

Respiratory and Vocal Mechanisms.

Voice is breath made vocal or phonetic. In other words, *voice is breath converted into sound*. Therefore, other things being equal, the more breath one has, the more voice, and the less breath, the less voice.

The reservoirs in which the breath is contained are called *the lungs*, and are suspended within the right and left cavities of the *thorax*, or chest, by the *windpipe*, which is bifurcated inferiorly, its two branches being named *bronchi*.

The substance of the lungs is very soft and elastic, and thus they are capable of great dilatation and compression.

The air-cells in the entire chambers of the lungs amount almost to the incredible number of six hundred millions, the aggregate surface of which

is equal to about twenty times the exterior surface of the human body.

The *number* of the air-cells cannot be increased, any more than the number of the eyes; but their *size* may be very much increased. In most persons, a vast multitude of these cells remains undeveloped.

Exercise in the open air is most assuredly beneficial to the lungs, for it expands them; while, on the other hand, the confinement of a person to his bed for three or four days, will shrink them of half their volume.

A person with a very small and contracted chest cannot have large lungs; for while the chest remains thus, the lungs have not room for their full development; therefore it does not follow that every person with a large chest can have large lungs. The thorax, or chest, is the respiratory chamber or apartment in which the lungs are contained. It is the house in which they live, and move, and have their being. Now, an apartment may be large, and yet its occupants small. A house may be large, while its tenants are dwarfs and pygmies. Or, to change the figure, the exterior shell of a nut may be large, and firm, and

strong, while, at the same time, the kernel within is shrunk and withered. So in regard to the lungs.

Those who rely exclusively on dumb-bells for the development of the lungs will find themselves miserably disappointed. They may thus increase the circumference of the respiratory chamber, but if they would develop the lungs to the utmost, THEY MUST BREATHE *artistically* and *systematically*.

In a sitting position, one loses from ten to fifteen cubic inches of lung capacity; in a recumbent supine condition, (that is, lying on one's back,) from twenty to thirty-five inches; in a recumbent prone position, from forty to fifty inches; and when the body is doubled up, as when one doubles or folds a sheet of paper, the lungs lose about one-half their capacity. Erect position, therefore, is everything for the full and healthy play of the lungs.

The reception of pure atmospheric air into the lungs vitalizes the blood, and fits it to subserve various purposes in the animal economy. The vitality of the external tissues, however, is dependent, not immediately and directly on the lungs, but on the air which is taken up by the capillaries. No

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matter how large a man's lungs might be, if his skin were varnished he would suffer very much, and soon die. If we were constituted like the feathered songsters, who breathe through every plume, we should have a voice equal to that of fifty stentors.

+ If you want to retain a healthy voice, never keep the neck tightly and closely covered. Let the air circulate freely around it, in order that the skin may become as hard as possible; for such is the natural effect of exposing even delicate tissues to the air, as might be illustrated by numerous cases in surgery.

The passage through which the air has its ingress and egress is a tube which may be divided into three parts. First, we have the *larynx*, or human whistle; next, the *trachea*, or windpipe proper, composed chiefly of cartilagenous rings, situated one above the other, and which are incomplete behind, their ends being connected by a membrane which forms the posterior part of that portion of the tube; and thirdly, the two branches into which the windpipe divides itself from the lower extremity, and which are called *bronchi*, and composed of fine cartilage.

The larynx is attached at its upper extremity to the hyoid bone, and connects itself with the tongue, and is consequently effected more or less by the movements of that organ. The cartilages *proper* of the larynx, as given by anatomists generally, are four in number: the thyroid, cricoid, and two arytenoid. There are other minor cartilages termed *corniculated*, from the Latin *corniculum*, which means a *little horn*. The office of the corniculated cartilages has not been satisfactorily discussed or explained by either ancient or modern physiologists.

I positively assert, from experience and observation, that the office of the *cornua* (horns) situated upon the upper surface of the hyoid bone, (a bone which lies at the base of the tongue, and immediately above the walls of the larynx proper,) is to serve as a martingale to the contractile functioning of the tongue; and that the office of the *cornua* on the upper surface of the arytenoid cartilages is to aid and regulate these same cartilages in the lengthening, shortening, and fixing of the thyroarytenoid ligament, or vocal cords. These *cornua* secure the tongue more strongly to that bone, and prevents the fibres of the base of the tongue from

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too great a contraction laterally, while we are contracting the apex of the tongue for the articulation of consonants. Were it not for this arrangement, we should incur the danger of closing the laryngeal orifice more than it ought to be, and thereby producing a constricted sound, as frequently happens in persons of acute voices, notwithstanding this provision of nature, because of their directing the mind to the upper part of the larynx, and contracting it when there is no necessity. The sound from this contraction constitutes what is commonly called "the throat tone"—coarse in texture.

The names *thyroid*, *cricoid*, and *arytenoid*, are derived from the Greek language. The word *thyroid* signifies having the shape of a shield; the word *cricoid*, having the shape of a ring; and the word *arytenoid*, having the shape of a pitcher, a ewer, funnel or ladle. These cartilages of the larynx were evidently thus named from their supposed resemblance to such objects.

The thyroid cartilage is situated at the anterior part of the larynx, and is the largest of all the cartilages of that organ. In fact, it forms almost the entire front wall of the larynx, and that pro-

jection in the neck which is vulgarly called "*Adam's apple*."

The cricoid cartilage is situated at the lower part of the larynx. Being in the shape of a ring, as its name indicates, it is united by its upper edge to the inferior borders of the thyroid and arytenoid cartilages. Its lower edge is attached to the first ring of the trachea.

The two arytenoid cartilages are united by their anterior edges to the posterior borders of the thyroid, and are situated behind the thyroid and above the posterior part of the cricoid.

The larynx is lined with a delicate substance called the mucous membrane, the continuation of which is the lining also of many other vital organs of the human body. (*Vide chapter on the mucous membrane.*)

The larynx is moved by certain organs called the vocal muscles, of which it is unnecessary here to speak particularly, but which are described, with more or less minuteness, in the leading works on anatomy.

The glottis is a small oblong fissure situated at the upper part of the larynx. Its superior and in-

ferior lips have been styled the *chorda vocales*—vocal cords.

The vocal cords proper are the inferior, or lower ones; are more appropriately styled the *thyro-arytenoid ligaments*, and derive their appellative from the organs to which they are attached. These ligaments are attached anteriorly to the thyroid cartilage, and posteriorly to the superior edges of the arytenoid cartilages.

The superior vocal cords are formed by a membranous fold of the larynx, and of the epi-glottis on either side of its base.

This laryngo-epi-glottidean fold always exists, more or less, when the vocal organs are in a passive state; but in persons whose voices have been thoroughly educated, this membranous fold, when the current of air is driven through the larynx with great force, becomes a mere extension of the epi-glottis, increasing its length.

The ventricles of the larynx are two small cavities, or chambers, forming recesses, as it were, in the opposite walls of the larynx, and situated between the upper and lower vocal cords.

The office or use of the thyro-arytenoid ligaments, or lower vocal cords, *hold the larynx firm*—

ly in whatever position it may assume favorable to the production of acute or grave sounds. The larynx takes the proper position, and then these vocal ligaments accommodate themselves to that position, and hold the larynx in it.

The common theory and prevalent opinion in regard to the vocal office of these ligaments, or cords, has been that they give *vocality* to the breath—that is, convert it into sound. These ligaments were supposed to perform the office of *musical strings*, like the cords of a violin; and certain muscles were regarded as the *tuning* power by which they were stretched or relaxed at will.

This theory—certainly in England and in the United States of America—has been quite popular, has been received without much examination, and has found favor with many physicians. You can take up scarcely an English or American work on the human voice without finding it gratuitously assumed. The theory was first promulgated in 1742 by Ferrein, an eminent French anatomist and surgeon, but has fallen into considerable disrepute in France, the country where it originated, and if we may rely on the authority of Colombat De L'Isere, we should infer that such was the fact; for

he says that "physiologists and especially modern naturalists have had reason to reject the theory of *Ferrein*, and to cease to regard the larynx as an instrument with strings."

This common vocal cord theory has been most unquestionably disproved. In the presence of leading medical men in the city of New York, and before a large audience, I have brought into full play all of my vocal muscles, and directed the pulmonic stream with the utmost force possible against the vocal ligaments, functioning them to their utmost ability, and yet, during this exercise, I have so entirely suspended the voice proper, that nothing has been heard but a whisper from the lowest to the highest notes, pertaining to the laryngeal register. If the mucous membranes with their attendant nerves, are in a perfectly healthy state, we have a clear, resonant voice. If these membranes be inflamed or relaxed, the voice is immediately affected. Hence what follows on disproving the vocal cord theory? The vocal cord theory being disproved, there seems strong reason to believe that the *mucous membranes, under the influence of those nerves from which they derive their mobility and sensibility, give out* PHONOS,

or sound. Now where does this vocality commence? In all probability, from the very first point where the pulmonic stream proceeds from the lungs, and continues and is increased according to the membranous surface which is physiologically contracted, till that stream makes its final exit at the lips. The writer respectfully claims this, not only as original with him, but a discovery of his own.

The epi-glottis is a fibro-cartilaginous valve—in shape almost like a leaf of parsley—is placed at the superior part of the larynx, and fixed to the upper border of the thyroid cartilage, behind the base of the tongue. It is sometimes regarded as one of the cartilages of the larynx. It is, however, a part of the larynx only in the same sense in which the cover that is fastened to the top of a silver cup is a part of that utensil. The Greek preposition *EPI* means *upon*, and hence the name *epi-glottis* signifies *upon* the glottis. It is situated immediately above the superior laryngeal orifice formed by the laryngo-epiglottidean fold already noticed.

Except when we are engaged in the act of swallowing, the epi-glottis always remains raised, so as

to leave the larynx open for respiration. It serves as a valve which, by closing the upper orifice of the larynx during deglutition, prevents the introduction of articles of food and drink into the air passages. It also acts, by its concave surface, as a reflector to *radiate* the sounds which issue from the glottis. If there be no epi-glottis, the vocal column ascends in a straight line until it meets the *dome* of the pharynx, and is thence driven behind the soft palate into the nasal chambers.

The epi-glottis, however, is not absolutely indispensable to deglutition, for even when this organ has been entirely destroyed by disease, the larynx, as nature often does in other emergencies, accommodates herself to the circumstances.

Next in order among the other principal vocal organs, are the *pharynx*, or *back part of the mouth*, the *veil of the palate*, the *uvula*, the *tonsils*, the *palatine arch*, the *nasal cavities*, the *maxillary sinuses*, the *lips*, the *jaws*, the *tongue*, the *teeth*, the *cheeks*, the *buccal chamber*, and the *diaphragm*.

The pharynx, or back part of the mouth, is a large muscular bag, or pouch, having seven *foramina*, (i. e., orifices, openings, or holes,) viz: the

ASOPHAGUS, or tube through which we swallow food, the *larynx*, the *buccal* cavity, or chamber between the cheeks, the two nasal chambers, and the two EUSTACHIAN tubes communicating with the drum of the ear.

It is a portion of the superior part of the vocal instrument, and receives the column of air after it has passed through the larynx and been radiated by the epi-glottis.

The v \acute{e} il of the palate, or, as it is frequently called, the soft palate, is a movable, soft, and broad curtain attached to the posterior extremity of the palatine arch, and separating the anterior portion of the mouth from the pharynx. In other words, the soft palate is a continuation of the arched roof of the mouth, and is composed of two folds of membranous tissue. It is consequently an extension of the sounding board, or *reverberating* surface.

In grave voices, that is, in voices having a bass register, it is situated closer to the posterior wall of the pharynx than in acute voices. The reason of this is, that in the grave voices, the larynx being situated lower in the neck, the vocal *radii*, after having been accumulated by the concavity of the epi-glottis, would (even if the lips and jaws were

well opened) pass into the nasal chambers, unless the soft palate were further in advance in the mouth. But the fact that such is its situation, its edges hugging closely the posterior wall of the pharynx, prevents the escape of the voice into the nasal cavities, and drives it forward into the buccal chamber. An artificial palate may be constructed and fitted in the mouth, when a person has been born destitute of this important organ.

A case occurred in April, 1860, in the practice of Dr. N. W. Kingsley, an accomplished dentist in the city of New York. A lady from one of the Southern states, who had been born without a soft palate, had placed herself under his care. The case was a very remarkable one, inasmuch as the hard palate or arched roof of the mouth was cleft through to the anterior process of the upper jaw; in other words, to that part of the jaw where the front teeth are inserted—no soft palate existing, and the fissure so wide as to prevent the uniting of its edges by the surgical operation termed *staphyloraphy*. In consequence of this mal-formation, not only was the voice prevented from passing into the chamber of the mouth because of the entire absence of the soft palate, but the patient was fre-

quently annoyed by the passage of food and liquid into the chambers of the nose. The eminent dentist who had charge of the case, easily conceived the idea that the fissure might be closed by means of an artificial palate, but the great difficulty was to make a *soft* palate that would attach itself closely to the soft parts of the anterior walls of the throat, and perform its functions so as to prevent not only the passage of the voice into the nasal chambers, but also the regurgitation of food.

After consulting with me concerning the action of the soft parts of the throat, during deglutition and the production of voice, and after having received the assurance that an artificial *velum* might be made continuous with the hard palate, he constructed one so delicate in its form and substance that the adjacent organs were easily educated to bear the presence of this foreign body. It was made of vulcanized India-rubber; it fitted admirably in the chamber of the mouth, and firmly retained its position. The lady could take it out and re-adjust it at her own pleasure.

This case was particularly interesting in its relations to vocal physiology, as it furnished a practical illustration of the fact that, in the absence of the

soft palate, the voice is necessarily driven up into the nasal chambers, and hurried onward till it finds its exit at the nostrils.

An extraordinary case connected with the structure and action of the soft palate, occurred in my practice during the winter of 1860. A well-known professional singer in the city of New York, aged about twenty-four, in possession of a beautiful voice, capable of executing melodies written for a soprano, extending as far as C in alt, came for consultation. This young man's voice, though of great compass, was at that time purely pharyngeal; that is, it was what is called the *false* *setto*, or, as Colombat De L'Isere more correctly styles it, the *faucette* voice.

On examining his vocal organs, I found that they all presented the appearance of marked health and freshness, particularly the soft parts of the throat. The organs were all situated as they should be, with this exception: that the position of the larynx was even higher than in the ordinary *soprani*, and its anterior conformation was not that which usually pertains to a voice of such remarkable acuteness.

This led me to examine more closely the position and action of the principal stays that held up

the larynx in the throat, namely, the anterior pillars of the soft palate. I found their traction on the larynx to be very great, consequent on their unusual shortness, thickness, and hardness.

From this state of things, I became satisfied that a slight transverse incision into the anterior pillars of the soft palate, on a line with the base of the tongue would relieve the larynx, although but a little, yet sufficiently to enable it to work favorably to the production of a register of intonations pertaining to itself. After convincing my young friend of the simplicity of the operation, as well as its safety, I obtained his consent to perform it. This was done, and was attended with very little hemorrhage. The only disagreeable feeling which the patient experienced after the operation—to use his own language—was a sensation like that of something in his throat, which he wished to swallow, but could not. He was requested to use his voice as little as possible, and not to attempt to sing for at least two months. The result was, that at the end of six weeks he visited me again in great glee, announcing the fact that his voice was changing. This was indeed the case. The character of the voice then resembled very much that

which we find in youths arriving at the age of adolescence. We strongly insisted on his remaining quiet for some time longer. A year passed away, and he became in possession of a voice which are not only beautiful in its texture, but a true *tenore contraltino*.

The uvula is an appendix, or prolongation, of the soft palate, hanging down in the shape of an inverted cone. Its excision should never be resorted to, except in extreme disease, and when all other means have failed to reduce it.

The tonsils are two almond-shaped glands, situated between the pillars of the soft palate, two of these pillars being attached to the right and left sides of the latero-posterior wall of the pharynx, and the anterior pillars run downward and forward to the sides and base of the tongue. The tonsils secrete a viscid mucus, which mixes with the food during mastication, and is necessary to the healthy lubrication of the adjacent organs.

The palatine arch is the hard roof of the mouth, and with the cavities of the nose and the maxillary sinuses, forms part of the reverberating surface.

The maxillary sinuses are those cavities in the

anterior part of the head which are formed by the jaw, and whose office has just been mentioned.

The office of the lips, jaws, tongue, teeth, and cheeks will be answered more particularly in a future chapter, when we treat of the molding of the vowels and the articulation of the consonants. It is sufficient, at present, to say that they modify the voice proper as it issues from the *buccal chamber*. This chamber, or cavity, is bounded laterally by the cheeks, and hence its name, (from the Latin word *bucca*, which means cheek,) superiorly by the roof of the mouth, posteriorly by the back wall of the pharynx, and anteriorly by the lips.

The conformation of the buccal chamber is one of the grand characteristics which distinguishes the physical organization of man from that of the lower orders of the creation. *According to my theory, the imperfection of its anterior part in brutes is what precludes them from the faculty of speech, i.e. in a mechanical point of view.*

The principal muscles of respiration, and the grand agent in propelling the vocal pulmonic stream, is the *diaphragm*, which is the flooring of the lungs and the ceiling of the abdomen. The *concave* base of each lung rests upon it during tran-

quill breathing; and the inferior surface of the diaphragm lies over almost the entire surface of the liver, which rests sluggishly on the stomach proper. It thus divides the organs of the chest from those of the abdomen, and is in continual motion from the moment we come into the world until we make our final exit.

The structure and shape of the diaphragm is tendinous in the centre, thin, almost circular, unequally convex upward, and fleshy at its circumference. It is attached to the *ensiform* or *xiphoid* cartilage, which terminates the sternum, or breast bone, beneath, and derives its appellation from its resemblance to a sword—the terms *ensiform* and *xiphoid* having the same meaning, the one being of Latin and the other of Greek origin. It is attached also “to the six last ribs, to the *aponeurosis* stretched from the last rib to the transverse *process* of the first lumbar vertebra, and, lastly, to the bodies of the three or four first lumbar vertebra.”

APONEUROSIS.—The ancients called every white part *neuron*, (nerve) and regarded the *aponeurosis* as a nervous expansion. The *aponeuroses* are *white shining membranes*, very resisting, and composed of fibres enterlaced. Some are continuous

with the muscular fibres, and differ only from tendons by their flat form.

The term *process*, when used in anatomy, denotes the eminence of a bone—also, any part which seems prolonged beyond other organs with which it is in connection. This is agreeable to its etymology, for the term *process* is evidently equivalent to *that which proceeds from*.

The *diaphragm* descends during inspiration, and, after reaching the lowest point, if the inspiration be continued, it finally flattens itself and projects in an outward direction. The diaphragm during expiration, (if the previous inspiration has been a protracted one,) first recedes or retires inwardly, and then ascends; thus recovering its natural form of an irregular arch.

To illustrate the movements of the diaphragm, take a glass jar, or receiver, open at the bottom, and having an orifice at the top, through which passes a glass tube connected with a membranous sac (a bladder, for example,) suspended in the receiver. Let the construction of the receiver be such that no air can come in from the sides, or from the top, except through the opening at the superior extremity of the glass tube. This tube

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represents the windpipe; the membranous sac represents the lungs; and the glass jar, or receiver, the walls of the chest. Immerse the lower part of the jar in a basin of water. The water will represent the diaphragm. On raising the jar a little, which is the same as causing the water (the diaphragm,) to descend, the pressure from below being removed, the air from above rushes through the glass tube attached to the neck of the membranous sac, and fills and distends the latter.

On the contrary, when we lower the jar, which is equivalent to causing the water (the diaphragm) to ascend, then the pressure of the water on the external surface of the sac shrivels it up, and thus squeezes out the air, which escapes through the glass tube. The rushing in of the air through the tube (when by raising the jar the pressure of the water against the sac is removed, there being thus a space, or vacuum, between the water and the sac,) corresponds with the act of inspiration, in which the diaphragm descends. The escape of the air through the tube, as we have just illustrated, corresponds with the act of expiration when the diaphragm rises.

In performing this experiment, the jar should be

raised *very gradually*, so as to fill the sac to its utmost capacity. If we raise the jar suddenly, then the sac will be but imperfectly filled. So, during inspiration, the air should be sucked in very gradually, in order to dilate the lungs as much as possible. Sudden, violent, and spasmodic efforts will fill them but very imperfectly and partially.

An instrument has been invented by me to show the quantity of air which each individual can take into his lungs by diaphragmatic action, and which is called an *INSPIROMETER*. A glass receiver, on the exterior surface of which is marked a graduated scale of figures, is partially immersed in water. This receiver is open at the bottom so as to admit the water, and has a gutta-percha tube connected with it at the top. The individual gradually sucks in the air through the tube, and during this act of one inspiration the water ascends. When he has finished, it is prevented from descending by turning a valve near the top of the instrument. The number on the graduated scale corresponding with the upper and level surface of the column of water in the receiver before commencing to breathe through the tube, subtracted from that to which the water has risen, shows the number of cubic inches of air

which have been taken into the lungs during one inspiration. Thus, if the column of water stood at the number 200, and the individual, during a single protracted inspiration, had raised that column to the spot marked 360, then the difference between the two, namely, 160, would show the result. In other words, the power of his diaphragm is shown, in this case, by the fact that during a single inspiration he has taken 160 cubic inches of air into his lungs.

The Guilmette Inspirometer differs most materially from all spirometers, particularly that invented by the celebrated Dr. Hutchinson of London.

The object of Hutchinson's Spirometer was to show the size of one's lungs by measuring the quantity of air sent forth during expiration, but the inspirometer measured the quantity taken in during inspiration.

The spirometer is not a fair test of diaphragmatic power; because, during the ascent of the diaphragm in expiration, it may be very much aided by the auxiliary muscles; whereas, during its descent in inspiration, it receives very little, if any, such assistance.

The *auxiliary* muscles of respiration are the

abdominal, dorsal, pectoral and lateral muscles. By their means the lungs can obtain a certain amount of breath. Even when nothing else can be done, the spine comes to our aid, and by bending the body, and thus curving the spine, we get a sufficiency of breath to sustain life.

The physiology of the diaphragm, hitherto accepted in popular treatises on the human voice, has not received the attention which it really deserves. Although all physiologists attach, in their elaborate writings, much importance to the diaphragm, yet they neglect the fact that the physiological use of the voice depends mainly upon the *highest educational functioning* of this muscle, and that if we have in our midst much *disphonia clericorum*, (clergymen's vocal difficulty,) as well as *dysphonia cantorum*, (singers' vocal difficulty,) it is because of a prevailing ignorance respecting the indispensable necessity of a healthy, vigorous, and regular action of this organ, for the most efficient style of speaking and singing.

The meaning of the term physiological, as applied to the use of any organ, signifies that which is natural and healthy—a distinction from that

which is unnatural and unhealthy, and which is therefore called pathological.

The natural phenomena dependent on the diaphragm are those of sighing, yawning, coughing, sneezing, laughing, sobbing, crying, hiccoughing, singing, speaking, etc. In fact, not only the functions of the throat and chest, but also those of the abdomen, are mainly dependent on this organ; and, when properly educated, it is the chief agent in producing all the dynamic effects pertaining to the voice.

The question has been asked: Can one of the lungs be severed without the destruction of human life? Our answer is, that one of the lungs may be severed, and the party may breathe and live. The wound may cicatrize and be healed; but the effect of severing the diaphragm would, yea, must, result in the death of the individual, because the respiratory chamber ceases to be air-tight, and respiration cannot be properly performed.

The strength of the diaphragm depends, in a great measure, on the temperament. Hence the man of bilious temperament, even with comparatively small lungs, may be able, by means of powerful diaphragmatic descent, to take into his air re-

ceivers a larger quantity of breath than the man of nervous temperament, though the latter might have larger lungs and more ample thoracic, or chest capacity. The reason of this is that in the bilious temperament the tissues of the body are coarser and stronger, and the powers of endurance greater. People of nervous temperament have less endurance, and therefore require a greater amount of physical education. The sanguine-nervous bilious temperament is the best for public speakers and singers. Those who have a strong infusion of the nervous in their temperament are the orators that electrify the world.

Remember that the vocal element is the breath—the lungs its reservoirs—the throat, the tube through which the pulmonic stream is to pass—and the diaphragm, the grand propelling agent. In public speaking or singing, therefore, there should be no perceptible effort in the throat, and until the diaphragm be thoroughly educated to do its work involuntarily and spontaneously, we must concentrate the mind on this very important muscle of respiration, instead of fixing it, as many do, on the abdomen.

The force of the column of air, if we desire to

use a large quantity of voice, should strike against the hard roof of the mouth, and the head of the column be directed forward to the lips, in order to get all the reverberating surface possible. It should also skim gently over the surface of the soft palate, to avoid paralyzing that membranous and delicate organ. In other words, there should be no more contraction of the soft parts of the throat during the emission of voice than is necessary to their physiological functioning for intonation. Now, as the mind is the engineer that presides over the respiratory and vocal mechanisms, you must accomplish the object by confining the attention of that engineer entirely to the organ which, at any given moment, is being particularly educated. Learn one thing at a time, and learn it well. You will thus master the whole subject, for the aggregate is made up of the individual units. If we fail in the first attempt, "try, try again!" with the full determination to succeed, and, the heart thoroughly engaged in the work, we can do almost anything, if we only think we can, and then, with a calm reliance on the aid of Divine Providence, make the effort with all our might.

"Possunt quia posse videntur."

The eagle who turns his blazing eye to the sun builds his nest on the highest cliff of the mountain-top. The man who is always creeping along the mountain's base will never reach its towering summit, or be rewarded with the most extensive view of the rich and glowing landscape.

In the practical study of vocal physiology, as in other departments of learning, set your standard high. If you do not accomplish all that you wish, you will accomplish much more than if your standard is low. A calm and just estimate of your own powers, accompanied by corresponding aspirations and exertions, until they are crowned with ultimate success, is not necessarily pride, in the bad sense of that term; for pride, in that import of the word, is not a well-regulated self-esteem, but that false and excessive estimate of one's own abilities and claims, which shows, in this respect, an ill-balanced mind, and often embodies a disposition to exalt one's self at the expense of the rights, comforts, conveniences, and feelings of others.

In making efforts for the attainment of any great and important object, you may often fail. But do not be discouraged.—“Failures are, with heroic minds, the stepping-stones to success.”

But to resume the thread of our discourse, there should be no more muscular effort in the throat further than simply to regulate the pitch, or intonation of the voice in respect to its being high or low, except occasionally, when we wish to make a grand "*tour de force*," and bring all our powers into action for the purpose of swelling the volume of sound. After such forcible muscular contraction, there should, if possible, be a long pause, in order that by complete relaxation the organs may have time to recover themselves fully.

The position most favorable for respiration is when the body is erect, the chest elevated, and the neck straight. Do not let the hands hang down while you are thus employed. There is considerable weight in the shoulders, arms, and hands; and if the hands hang down, the chest is depressed. A good position for the hands when at rest is to keep them gently and gracefully closed in front, in the region of the diaphragm. The elevation of the chest can thus be kept up, and the hands be moved in gesture either to the right or the left.

In inspiration, the lungs and heart are lengthened downward; the clavicle, or collar-bone, the sternum, or breast-bone, and all the annexed ribs, are

raised; the upper ribs converge, the lower diverge, the upper cartilages form a right angle with the sternum, and the lower cartilages of opposite sides, from the seventh downward, move further asunder, so as to widen the space between them just below the xiphoid cartilage—the effect being to shorten the neck, compress the abdominal viscera, and raise, widen, and deepen the chest.

During expiration, the position of the ribs and cartilages is reversed; the sternum and ribs descend; the upper ribs diverge, the lower converge; and thus the movement of these organs is the opposite of that which takes place during inspiration. The last act of expiration, or the one which immediately precedes death, is usually more extensive and forced than that which takes place during ordinary tranquil breathing.

The physical exercises which may be performed with advantage, in order to strengthen, develop, and get control of the respiratory mechanism, are, to stand up, and take the proper position; heels together; body erect; neck straight; draw in the pit of the stomach; and, before commencing to breathe artistically, elevate the chest so as to give all possible play to the diaphragm; place the tips of the

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fingers on that very important muscle, and get the entire control of its movements by directing to it the attention of the mind, which is the grand engineer. Having made these preparations, breathe a few times in the ordinary tranquil way, as preliminary to the deep, artistic breathing which is to follow. Then make the orifice of the lips as small as you can; draw in the air as slowly and with as little effort as possible, with no more force than is necessary to produce the gentle trembling of a rush-light; and when the lungs are full—which you can ascertain by the protrusion or swelling out of the diaphragm,—stop breathing, and for a few seconds retain the breath thus accumulated. Then breathe out the air as slowly as you can, and during expiration let the chest go down very gradually indeed.

Repeat this artistic breathing a few times, in order that every cell in the lungs may be filled with air. Begin these exercises at first with great caution, as the blacksmith begins his work with a little tap of his hammer on the anvil before he gives the ponderous blow. After having filled the lungs to their utmost capacity, pronounce aloud the words one, two, three, four, five, six, seven, eight,

nine, ten, and take a short breath between each of them. In the act of pronouncing them, blow forth *a stream* of air through the vocal tube, remembering that voice proper is simply breath converted into sound. Begin the utterance of each of these words very gently and softly, and then gradually swell out and prolong the sound. After having practiced on the words separately, it will be useful occasionally to pronounce them all in one breath.

The object of the foregoing exercises is *to get command over the breath in the utterance of words.*

We should never speak during *inspiration*, but invariably during expiration.

To attempt speaking during inspiration will produce stammering.

This fact suggests, in regard to the philosophical cure of stammering by means of vocal exercise, that one who has a tendency to stammering, or any such impediment, should be careful, before commencing to speak, to see that his lungs are supplied with a sufficient quantity of air, and then utter his words while the pulmonic stream is going forth—thus overwhelming the spasm with the breath column. The vocalization, or utterance, should be

simultaneous with expiration, and, though the lungs have been well filled with air, the breath should all be converted into sound; for it is the *substance* and *element* of the sound, and therefore both in speaking and in singing, should go forth from its reservoirs neither faster nor slower than the sound itself. This perfect control over the column of breath can be accomplished only by the *scientific education of the diaphragm*.

It is thus that I am able, while the pulmonic stream is issuing from my lungs, (when in good training, and after a full inspiration,) to prolong a pure vocal intonation for more than a minute and a half. This seemingly incredible feat has been frequently performed by me, and can be vouched for by Drs. Ogden Doremus and Fordyce Barker, two of the most distinguished Professors in the city of New York.

Again: one who has a tendency to stammering should likewise avoid too much labial contraction, particularly in the articulation of those consonants where the lips come together, for it will only increase the difficulty. His vocal exercises should be chiefly on the moulding of the vowels, a topic which will be fully discussed anon. In some cases,

however, the prolonged vibration of the apex of the tongue while rolling or trilling the letter R, is also very useful to overcome the spasms of the hyoglossal muscle (that is, the muscle of the tongue, connecting it with the hyoid bone).

No speaker should deliver his discourse with a succession of spasmodic jerks, unless he wishes to injure his voice, and diminish the effect which his speech would otherwise produce on the audience. Let the voice be all pulmonic, as distinguished from what may be called the spasmodic and muscular, and let the orator blow forth a steady stream of air from the very depths of his lungs. It is *the pulmonic*, or *breath voice*, which enables us to give the proper effect to those dynamic words which *intensify* the poetry of language; and it is by the physiological use of the diaphragm that we can impart to that style of voice all those varieties of light and shade that are so impressive in accomplished orators and vocalists. Here, we may be asked if the difference between the pulmonic and the muscular tones is the same as the distinction between *head* and *chest* tones? Not at all. The latter distinction belongs to the registers of the voice, which we shall discuss in a future chapter.

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We must carefully discriminate between the *modifications* of the breath and the simple *voice proper*, or breath converted into sound. The *modifications* of the column of breath made vocal are produced by the jaw and other organs. The use of the larynx in regulating the pitch and giving variety to the intonations of the voice, will be noticed hereafter.

Another caution may here be given to a public speaker: Never huddle up, bending and stooping over, and crowding the vital organs, just before addressing an audience. Give every possible advantage for the healthy physiological use of the voice. If in the sitting posture, keep erect, and, without attracting the attention of those present, gently suck in the air. This will insure a good supply of breath before beginning.

But to return from these digressions, which, however, are none the less practical and useful, the next respiratory exercise is for the development of the chest and lungs.

Take your position as before; heels together, body erect, chest elevated, diaphragm free; fill the lungs with air, place one hand on each side of the chest, and swell out its walls very gently and

slowly, while retaining the breath for a few seconds.

Do this very cautiously; otherwise, as the lungs are now distended to their utmost capacity, you might rupture a blood-vessel. Be careful to let the air pass out very slowly, and the walls of the chest descend very gradually.

This exercise will give you immediate pulmonic development. Do not be alarmed, if at first it should make you a little giddy. The reason of this is, that the *conduits* to the brain are not yet equal to the quantity of blood which should be carried to and from that organ. If you feel giddy, give the head a slight shake, and wait a few moments till the giddiness passes off.

The object of the next exercise is to get a proper action of the diaphragm. This muscle, as we have already shown, descends in *inspiration*, and when it has reached the lowest point, if the breathing be continued, it protrudes or swells out, and then, during expiration, it retires inwardly and ascends. The body being erect, and the chest elevated, as in the preceding exercises, place the backs of the fingers towards each other and let their extremities touch the region of the diaphragm.

In this way command that great muscle of respiration and concentrate the mind upon it. The mind, as we have already said, is the engineer, and the engineer must have his thoughts on the engine which he is going to work, that is, the diaphragm. Fill the lungs with air, and cause the diaphragm to have its appropriate play. Move it in and out. Do this not only by respiration, but also by the direct action of the muscle itself, independently of the breathing.

The next exercise is for the development of the ribs. One part of the ribs is gristly or cartilaginous; the other part is osseous. If we do not exercise the ribs, they become more and more osseous and less and less cartilaginous. Therefore cultivate elasticity of the ribs. Let the bones be well lubricated by constant exercise, and then they will not be easily fractured. Laboring men are thoroughly impregnated with fluid. The work they have to do is constantly exercising their bones and keeps them from getting dry. It is otherwise with persons of sedentary habits. Even a slight fall will sometimes fracture their limbs.

The exercise for mobility of the ribs is to place the right thumb in the right arm-pit, and the left

thumb in the left arm-pit, the fingers resting downward and obliquely on the chest, so that the extremities of the hands shall incline towards one another.

Press in the ribs, squeezing out the air by thus contracting the walls of the chest and also by expiration at the same time; then gradually and slowly fill the lungs with air. After doing this twice or thrice very slowly, repeat the exercise rapidly several times, independently of breathing, that is, without stopping to pay any particular regard to respiration. In this rapid exercise press in the ribs, and let them recover themselves, drawing back the shoulders vigorously, and causing the elbows to approximate towards one another behind. By the faithful practice of this exercise get all the flexibility of ribs that you can, for costal mobility is of immense importance with respect *to the physiological use of the voice*.

The last exercise which at present claims our attention is for the development of the muscles. What lathing is to the walls of a house or an apartment, the ribs are to the lungs; and what plastering is to the walls, the muscles are to the chest. Stand up as in the preceding exercises, and

take an erect position, the heels touching one another. As preliminary to the grand exercise for the muscles, extend the arms at right angles to the chest or even as high as the mouth, and then draw them backward and project them forward with moderation several times. Then extend the hands and arms forward to their utmost length and on a level with the mouth, palm to palm, and fingers to fingers, in close contact—the fingers stretched out, not interlaced—pronounce the words *one, two, three*, and at the word *three* draw the arms forcibly back, closing the fist. In this powerful exercise take time, get ready, and when you are fully prepared, contract with all your might; then relax immediately. Next place the hands on the chest, wait a few moments, and then project the arms forcibly forward, bringing the arms and fingers together, as in their former position. Repeat this exercise a few times, and stop when you find yourself perspiring.

In all these exercises be very gradual in the doing of them. Educate the organs. Let them have time to become accustomed to their work. It is not so much the *quantity* of exercise; *quality* is the thing. Never mind if you sometimes feel a

little sore, particularly about the ribs. It will not hurt you. But be careful not to ~~overdo~~ the matter. Do not attempt too much at once. Give yourself all the needful rest.

These exercises should be practised until the respiratory mechanism is fully developed; those for the ribs and muscles should be practised at least twice a day, but never *immediately before or after* a full meal. The breathing exercises, six or eight times every two hours during the day.

My personal experience in regard to the benefit of these special respiratory and vocal exercises, as affecting my own individual health is, that, in the year 1853, I weighed 120 pounds. My maximum thoracic capacity, or circumference of the chest after a full inspiration, was 37 inches. The duration of respiratory movement, or length of time occupied by a single inspiration protracted as much as possible, was a little over one minute. The duration of expiratory movement, accompanied from beginning to end by vocal sound, was less than one minute. In June, 1860, my weight was 154 pounds. *My vital capacity volume*, 225 cubic inches; that is, I could take in that quantity of air during one inspiration, as indicated by the *Inspirometer*. My

maximum thoracic capacity, 43 1-2 inches. My minimum, or smallest circumference of the chest, after expelling the air from the lungs as much as possible, 36 3-4 inches. Duration of inspiratory movement, 123 seconds. Duration of expiratory vocal movement, 95 seconds. My height, about five feet four inches. To-day, December 1st, 1876, my weight is 182 pounds, solid tissue. *My vital capacity volume* has reached the extraordinary capacity of 320 cubic inches, thereby enabling me to execute the most lengthily written sentences in one breath, in Handel's great work of *The Messiah!* vide "*Why do the nations,*" &c.

I will now recapitulate: The only true physiological theory respecting the production of voice. I cannot, strictly speaking, call it my own, inasmuch as "man is but the speaking trumpet of other men's ideas;" nevertheless, by dint of persevering efforts in digging out clean material from the rubbish of ages, I have been enabled to present the *alkaloid* of vocal physiology. ECCE—*vox, voix, voce, phonos*, voice is nothing more or less than breath *converted into sound*. The air which inspiration has introduced into the lungs, is driven out from their cavities by expiration, and traverses

the entire surface of the windpipe, larynx, pharynx &c., and it is *during* EXPIRATION, *and simultaneously with it*, that voice is produced in a physiological, natural and healthy manner. Next: the diaphragm is the principal muscle of respiration. It is to the highest educational functioning of this organ, that we most chiefly look for the ability to produce *all those varieties of light and shade in the human voice which form the perfect transcript of the passions and emotions of the soul.*

Thirdly: The commonly received vocal cord theory *is false*. Its advocates maintain that the thyro-arytenoid ligaments of the glottis perform the office of musical strings! and that the current of air, in playing upon these ligaments, is like the bow which sweeps the cords of a violin. This theory may be disproved by auricular experiment.

Fourthly: The *mucous membranes*, or lining of the *bronchial tubes, trachea* or windpipe, *larynx, pharynx, soft palate, buccal* and *nasal cavities, &c.*, under the influence of the nerves of *mobility* and *sensibility*, produce, physiologically, *the voice proper*. In other words, the air, driven out from the lungs, causes, by its more or less rapid passage and stimulating action, the mucous

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membranes to function or work in strict accordance with their individual physiological functioning or working, to *phonate*, give out or produce *phonos*—SOUND—*voice proper*. The movements of the *larynx*, and the consequent lengthening or shortening of the vocal tunnel, modify the sound in respect to pitch only, and make it *acute* (high) or *grave* (low) as the designs of the individual require. Thus the air which is taken into the lungs and then, by the expiratory movement driven out during vocalization, is the *pulmonic* stream that constitutes the substance of the human voice; the *diaphragm*, the chief agent which propels that stream; *the mucous membranes*, the most extensive of the membranes of the body; the great body *phonator*, the larynx, epi-glottis, pharynx, soft palate, buccal chamber, lips, tongue, teeth, &c., the instruments which modify it; and, finally, the mind is *the engineer* which presides over all this complicated mechanism, directing, controlling, and governing it at will. These principles are of great use in regard to the preservation of life and health.

They are, so far as vocal physiology is concerned, of supreme and paramount importance. They

are useful to all, but especially to public speakers and singers.

Parents and guardians should take heed that those committed to their charge have a sufficient supply of pure air to arterialize their blood; that they take enough bodily exercise to strengthen, *but not fatigue and exhaust, their muscles*; that their studies and toils should not overtask the brain, and should alternate with cheerful, but innocent, recreations; that they retire at seasonable hours, to invigorate their nerves by the requisite amount of quiet sleep; and that their respiratory and vocal organs be so trained and developed as to endure without danger all the labor which may devolve upon them in the various duties of life. Thus would our physical well-being be greatly advanced, human life would be very much prolonged, the feeble will be strengthened, and those who start with healthy constitutions might, with reasonable prudence, be expected, God willing, to live to a vigorous old age.

LECTURE THIRD.

THE VOICE.

The voice is an instrument *sui generis*,—an animate sound, intelligent and articulate, of which the air is the substance, the mucous membrane the *phonator*, and the MIND the motor, directing its varied expressions and adapting them to the demands of the instant.

From the remotest antiquity, its formation and health have engaged the attention of physiologists; and though much truth and many plausible theories are bequeathed us through the instrumentality of their investigations; yet daily observation and experience prove, either that there are hidden laws concerning this important faculty not as yet revealed, or that there is an unaccountable amount of ignorance and perversity extant, altogether inconsistent with the intelligent enterprise of the age.

Doubtless there are none among the more *deeply* learned in this department of physiology who would venture openly to declare that present research has reached the utmost bounds of discovery, or the final ramification of the laws of the vocal mechanism. Hence I am encouraged to present for consideration such results of my earnest investigations as appear to me to be *new truths* in this department of physical science.

In order to a clearer apprehension of the just value of these inferences, it will be necessary to contrast them with parallel deductions of eminent authorities, as brought down to the present day, and submit them to the test, not merely of logical, but practical, demonstration. As preliminary to this duty, permit me to call your attention to the manner in which the expired air traverses the larynx. At first, the air, which inspiration has introduced into the lungs, is driven out from their cavities, and in its passage sweeps over the entire surface of the windpipe, larynx and pharynx, etc., by the impulse of expiration and the play of the respiratory muscles. This is the first act necessary for producing sound.

Now, some authors have labored to prove that

the voice is produced during *inspiration*. It is difficult for my mind to regard such an argument other than an ingenious bit of pleasantry, although I admit there are some illustrations of this theory recorded, in the cases of individuals afflicted with long-continued paroxysms of coughing, who have been known (as an only alternative) to speak during inspiration. Let me lay down, therefore, as an important premise in my present argument, that the formation of the voice is an expiratory phenomenon. The next thing, in order, that I desire should be taken for granted, for the present, is, that the *glottis* is NOT, as has been generally supposed, the organ essentially phonetic. I hope, presently, to convince you of the truth of this important proposition. To return to our proposed citation of theories of eminent authors upon the phenomena of the voice. I shall, of course, rehearse but those which, in different ages, have been esteemed the most authentic.

Aristotle and Galen compared the larynx to a *flute*; and regarded the *trachea* as the body of the instrument.

DODART, in 1700 A. D., essentially modified this previous theory, by declaring that the voice is pro-

duced upon the principle of the *trumpet*. According to his theory, the glottis is the point which answers to the lips of the musician; the body of the instrument extends from the glottis to the external orifice of the vocal canal, or, in other words, the mouth.

In 1742, *Ferrein* declared that the larynx was an instrument with strings, and compared it to a violin. He likened the ligaments of the glottis to the strings of a violin, and gave them the name, "*chordes vocales*," or "vocal cords." The current of air was the *bow*—the thyroid cartilages the fixed points—the arytenoid cartilages the pegs—and, finally, the muscles inserted into them the *tuning* power, by which the cords were stretched or relaxed at will. (*Vide Lecture II.*) When we remember that the conditions essential to the sonorous vibrations of a cord are, liberty of motion, connection with a sonorous body, dryness, tension, elasticity, arbitrary length, and, finally, consistence—and that none of these conditions are to be met with in the so-called "vocal cords"—we shall duly estimate the value of M. Ferrein's theory.

Bichat employed his brilliant genius in an extended series of curious experiments, the most of

which were verified, subsequently to his death, by "Magendie." The results, however, were not, to his mind, sufficiently satisfactory to admit of any positive deductions. It is to be regretted that he finally yielded the subject, with the declaration—"that the gradation of the vocal sounds would, for a long time, be an object of research: a problem so difficult will never, perhaps, be resolved in an indisputable manner."

The next authority, in our order of succession, is *Prof. Richeraud*, whose opinion is a concrete of all the foregoing theories; for he maintains that the larynx is, at the same time, both a string and a wind instrument.

The profound Buffon, and the learned *Cuvier*, rank the vocal organ in the class of flutes, and regard the glottis as the *reed* of the instrument, the mouth as the body, and the nostrils as the lateral holes.

The illustrious *Magendie* has given to the larynx the name of "*human-reed*," and thinks that this organ should be compared to our reed instruments, such as the haut-boy, the bassoon, etc.

Savard, who has published some remarkable works upon the formation of the voice, likens the

larynx to a kind of whistle, a short instrument, pierced at each end by a small orifice, and used by huntsmen to imitate the cry of birds. He, consequently, infers that the ligaments of the glottis, and the ventricles that open between them, take an essential part in the primitive formation of the vocal sounds. The air, traversing the glottis, strikes upon the superior ligaments; these bind the superior opening of the instrument, and discharge the same function as the stopper that apporions the wind in an organ-pipe. Then, the air contained in the larynx vibrates, and gives out a sound, which increases in intensity, because the sonorous waves that form it are prolonged into the pharynx, the cavity of the mouth and nasal fossa. It is evident that the author of this system seeks to account for the uses of the ventricles of the larynx, and for those of the superior ligaments, of which no mention is made in other theories.

The deductions of *Savard*, although well recognized by his admirers, were refuted by Colombat de l' Isere, who, in his numerous autopsies, which he made for the study of the larynx, sometimes found this organ destitute of ventricles and of superior ligaments, in individuals, among whom

were several who, in life, had a fine vocal timbre. He says, in his great work on *Orthophony*: "One fact which, I think, goes to prove that the superior ligaments and the ventricles do not play so important a part as that assigned them by M. Savard, is, that if they are divided in a dog, or merely cauterized, to prevent their action, the voice of the animal is not altered or destroyed, unless the incision or cauterization be prolonged downwards, past the inferior ligaments, that" [he adds] "form the true glottis," and, according to him, are "the efficient cause of the voice."

Let us bring this reasoning of Columbat de l'Isere to the test of the *reductio ad absurdum* process. If I cut your throat a little bit, it does not destroy life: hence, throat-cutting does not destroy life, *UNLESS* the throats are sufficiently cut. So, also, do I prove that the sheepskin of a drum is not the efficient cause of its sound; for, if I make a small incision in the head of a drum, it does not destroy its sound, *unless* the incision be prolonged. But, suppose the incision *be* prolonged — what then? Why, the *cause* being destroyed, its legitimate *effect* ceases. Precisely analogous to this, is the case in hand. The animalization of the laryn-

geal lining tissue being destroyed by the knife or cautery, which animalization is derived from arterial vessels, veins, lymphatics and nerves, no voice can exist. Is it too much to say, therefore, of *l' Isere's* argument, that, while it disproves *Savard's* theory, it completely demolishes his own?

Other theories might be added to those of the foregoing; but, inasmuch as they are all, more or less, modifications of the same general idea, the citing of them would unnecessarily consume both time and patience. Enough, I think, have been advanced for our present purpose, which is to compare my own postulates, or premises, on this subject, with those of the commonly-received authorities.

It will be perceived that present methods for the formation and health of the voice are radically founded in what I trust I have convinced you is a mistaken idea, viz.: that the voice answers to the construction, and, consequently, to the laws, of certain musical instruments, between which, we have seen, there is but a very slight analogy. Now, I shall presume to maintain, on the contrary, that the larynx resembles nothing but a larynx; and that the living mechanism of the voice

cannot be treated of as an inanimate structure, because it is endowed with the incommunicable principle of vital action, and is, in all respects, answerable to the laws of vital growth and expansion.

This prepares me to state, succinctly and intelligibly, the grand result of my own researches in this important field of investigation. It is, briefly, this, viz.: that the *mucous membrane*, or skin, which covers the inner surface of the bronchial tubes,—the *windpipe*, the *larynx*, the *pharynx*, the buccal and nasal cavities,—is the PHONATOR, or seat of phonation. In other words, the air, driven out from the lungs, under the influence of the will causes, by its more or less rapid passage, the mucous membrane to *phonate*—give out voice—in accordance with its healthful contraction or expansion. Meanwhile, the movements of the larynx, and the shortening and lengthening of the vocal tunnel, by diminishing or increasing the phonetic surface, produce acute or grave sounds, as the designs of the individuals may require; precisely on the principle that a small drum-head produces an acute sound, while a greater *expansion* of sheepskin gives forth a deeper or graver

tone. Allow me to give auricular evidence of the truth of this theory, by arresting the physiological contraction of the mucous membrane, during the production of acute or grave sounds. You will perceive that the varied intonations whisperal are produced simply by enlarging or diminishing the size of the glottis, which is brought about by a certain, minute lengthening or shortening of the vocal cords, or, properly speaking, the *thyro-arytenoid* ligaments. To illustrate this vocal phenomenon,—any one can do so by positioning the lips favorably to the production of a whisperal whistle,—the student can ascend the scale of whisperal intonations just as high as the close approximation of the lips will allow,—the orifice resembling the glottis, and the thin edges of the lips answering to the vocal cords, so-called; in other words, the lower we desire to go, the wider must be the orifice between the lips, and the higher, or more acute, the sound, the smaller must be the glottis, or orifice, or hole, through which the breath has to traverse. Yet, these *sphincter* sounds are limited, and do not embrace more than one half the entire compass, or registers, of the vocal instrument when confined to the exclusive functioning of the

laryngeal mechanism. (*Vide chap. on Registers.*)

In conclusion, and by way of a resume, permit me to say that my aim, thus far, has been:

I. To show, by general anatomical demonstration, that the mechanism of the human voice *exceeds the limits* heretofore popularly assigned to it.

II. That, hence, the theories on which the modern modes of vocal development depend, not being founded on truth, are *philosophically and essentially defective*.

In maintaining the first of these two propositions, I have sought to prove, by a variety of illustrations, my new theory, viz.: that, for the proper development of the lungs, the attention must be directed principally to a suitable exercise of the *diaphragm*; that the commonly-received opinion, that a large chest necessarily implies large lungs, is a fallacy.

I have shown that the development of the chest depends chiefly upon the exercise of the external muscles; while the development of the lungs, as I have just asserted, is effected mainly by the intelligent use of the diaphragm, elevating the thoracic, viscera, or organs of the chest, and depressing the

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abdominal, in order that space may be afforded for its own free operation.

The importance of the proper education of the diaphragm will be apparent when I assert, what has never, to my knowledge, been before advanced, that it is to the proper control of the diaphragm that we are indebted for all those dynamic effects of light and shade that are so impressive in the voices of accomplished orators and vocalists.

I have, in the progress of my argument, held up to view the deductions of eminent theorists regarding the *efficient* cause of vocal sound, in order that you may better appreciate the value of my own theory: that it is not the larynx, nor yet the glottis. The anatomical conformation of the larynx simply gives, at its superior portion, under the guidance of the *will*, a series, a succession, a limited number of different-sized openings, apertures, or glottises, so-called, favorably to the production of acute or grave laryngeal sounds, which gradation constitutes barely one third the compass of the entire vocal scale in the majority of educated voices. A most indubitable proof of this assertion is, that with persons endowed with high, or acute, voices, when the larynx is invaded by disease, so as to

produce complete aphony, or loss of the laryngeal register, the glottis of the pharynx comes into play, entirely independent of the movements of the larynx, and another will come out, possessing another quality, soft, rich, mellow, and capable, in many cases, of reaching high E in alt,—some twenty-six semi-tonic sounds higher than the would-be-made bombastic uplifter of vocal-phonos (the larynx) could possibly attain or acquire. That the mucous membrane is the *phonator*, or seat of *vox*, *voix*, *voz*, *voce*, *voice*, or by whatever name you please to call it.

In view of my arguments, it is easy to determine why such varied diseases of the vocal organs abound among us at the present day; the fatal fruits of degenerate seed. Is it the will of God? Nay, was it His design, when He planned the vocal mechanism, that it should shrivel to inefficiency when employed in ministrations at His altars, while it justifies His wisdom in the cry of the chimney-sweep?

The system of physical development which I have framed upon the basis of my discoveries has, in every instance where no irremediable obstruction existed, proved curiously efficient; accom-

plishing the desired end within *one third* of the time usually devoted to the formation of the voice, and without fatigue of the organs.

It has been subjected to numerous experiments, and has ever been found capable of producing full vocal development without the employment of *vocal sound* on the part of the student.

It directly promotes the general health, in consequence of the right exercise that it demands of certain vital organs that I have proved to be intimately connected with the vocal mechanism.

Moreover, it is susceptible of enlarging, modifying and improving the voice up to an extreme old age; giving volume and firmness of tone at a period to which, it is generally supposed, nature denies those desirable qualities.

LECTURE FOURTH.

THE

MUCOUS MEMBRANE.

This membrane is much the most extensive of the membranes of the body. It is similar in texture to the skin, and is considered to be merely a reflection of it. It lines all those cavities which communicate with the exterior integuments, and is continuous with them. It is soft and velvety in its texture, and extremely vascular. In the human subject, it has two divisions, the gastro-pulmonary, and the genito-urinary mucous membrane. It is, however, the former which requires our more immediate consideration.

The gastro-pulmonary mucous membrane commences at the edges of the eye-lids, *nostrils*, and lips; that part covering the eyes communicating with the nose by the lachrymal canal, through which the tears flow. Behind the soft palate, the

mucous membrane from the mouth and nostrils becomes continuous, and from the throat downwards it proceeds in two divisions,—the one to cover the air-tubes, the other to line the alimentary canal. This membrane lines not only these passages, but the small ducts leading to them, such as the eustachian tube, leading from the throat to the internal ears, the biliary ducts, etc.

It is estimated, and correctly, too, that the internal covering of mucous membrane of the bronchi and cells of the lungs is in extent equal to twenty times the surface of the whole human body. The mucous membrane being identical in structure throughout its extent, every part sympathizes more or less with the rest; and when the irritation of any part is violent, the alarm extends to the whole membrane. An inflamed eye-lid is often the result of irritation of the mucous membrane of the bowels; and irritation at the end of the bowel, either from oscarides or hemorrhoids, may produce dullness of the eye, itching of the nostrils, etc.

“A remarkable sympathy,” says the distinguished physiologist, Muller, “is observed to exist between the mucous membranes; thus their diseases, particularly the mucous discharges and the

catarrhal affections, have a great tendency to spread in them. By virtue of this sympathy, the state of one part of these membranes may be ascertained by examining another part; so that the state of the mucous membrane of the sides of the tongue indicates the condition of that of the stomach and intestinal canal." The state of the mucous membrane at the base of the tongue will also indicate the condition of the mucous membrane of the laryngeal chamber.

"All the mucous membranes have, likewise, an extraordinary connection with the respiratory movements; thus irritation of the mucous membrane of the nose produces sneezing; irritation in the pharynx, oesophagus, stomach, or intestines, excites the concurrence of the respiratory movements; vomiting, or violent irritation in the rectum, bladder, or uterus, gives rise to a concurrent action of the respiratory muscles, so as to effect the involuntary expulsion of the fæces, urine, or foetus. Irritation of the mucous membrane of the larynx, trachea, or lungs, or even itching; from irritation, of the eustachian tube, excites coughing." This remarkable sympathy between the various parts of the mucous membrane is an established fact, and

has a most important bearing on the timbre, quality and resonance of the voice. For example: presuming all things equal, a vocalist desiring maximum vitality of voice must have a strong, healthy, and clean mucous membrane throughout the entire body. The same may be said of the common skin, or outer covering of the body.

The mucous membrane, like the skin, is composed of three layers: First, the epithelium, which is the cuticle of the membrane, and is continuous with the cuticle at the margin of the lips. The epithelium, seen under the microscope, presents two forms,—the pavement, or tessilated form, and the columnar form. As the columns are placed perpendicular to the surface round the circular villi, they appear to have a radiated arrangement, and their free extremities are sometimes fringed with minute hair-like threads, or cilia. When this is the case, the epithelium is said to be ciliated, and it is in this form that it lines the air-passages. It requires a powerful microscope to discern the ciliary motion of the epithelium, but when viewed in the field of an instrument of sufficient power, I know of no object more interesting. It has been compared to the undulations on the surface of a

fluid with small bodies floating upon it, which, near the borders of the membrane, appear as if driven along in a determinate direction. As these motions of the cilia are always towards the outlets of the cavities which they line, it is believed that their function is to *force* the *secretions* which may accumulate outwards, and thus effect their removal. The ciliary motion of the mucous membrane is supposed to be caused by the action of some *unknown contractile tissue*. In *disease* of the mucous membrane, the epithelium is undergoing a constant process of removal, *but it has the power of reproduction to an indefinite extent*.

The second layer is the *proper mucous*, or papillary, which is also analogous to the papillary layer of the skin. It is the *secreting surface* which produces the epithelium. Its surface presents, under the microscope, diverse appearances, according to the situation in which it is found, sometimes appearing as if formed of numerous projecting papillæ, at others of a fine network of polygonal cells.

The remaining layer, the fibrous, or sub-mucous, analogous to the corium of the skin, is designed to give support to the papillary layer.

In the loose cellular tissue, which connects the two latter layers, are situated the glands, or follicles, which are peculiar to the mucous membrane. These glands, or follicles, are of two kinds,—simple and compound. These glands, or follicles, are much more abundant on some parts of the mucous membrane of the air-passages and oesophagus than on others; thus the *tonsils* are almost entirely composed of mucous follicles, united together by cellular tissue. The glands of the *uvula* are, also, both large and numerous, especially towards its point. At the *base of the tongue* are two or three clusters of follicles. The pharynx is well supplied with them, but they are present in the mucous coat only, while in the oesophagus are many small lobulated bodies, imbedded in the sub-mucous layer, and opening on the surface by long excretory ducts, which pass obliquely through the mucous coat in such a manner that the food, in passing down the oesophagus, cannot find ingress into them. The epiglottis and larynx are, also, plentifully supplied with these glands, most of which are imbedded in the sub-mucous tissue of these organs. In the trachea they are even yet more plentiful.

The mucous secreted from these organs, when in a state of health, is transparent and moderate in quantity; but, in chronic inflammation, or congestion of the air-passages, the mucous secretion may become excessive, deficient, or vitiated.

It must, also, be borne in mind that all the mucous membranes are exposed to the influence of certain sources of irritation, which have an effect upon their secretions, and there is little doubt but that the office of these secretions is partly to guard the membrane from injury in these cases. They have a natural irritability to healthy and beneficial influences. Thus, for example, the mucous membrane lining the air-passages is naturally fitted to the healthy stimulus of pure air; while, on the contrary, an impure atmosphere, deficient in oxygen, loaded with noxious vapors, or solid particles of matter, necessarily irritates the membrane, and affects the secretion from its surface. If these sources of irritation are frequently renewed, a chronic disease will probably ensue; even as the mucous membrane lining the digestive organs, being accustomed and fitted to the healthy stimulus of good and wholesome food, when subjected to the action of substances indigestible or too stimu-

lating, becomes irritated, and manifests abnormal phenomena, either in the membrane itself or in some remote but sympathizing organ, as when cough follows the introduction into the stomach of indigestible food.

An excess in deficiency of the natural stimuli, or the operation of noxious agents, will convert healthy into morbid irritability; and a *natural* stimulus applied to an organ, already morbidly irritable, becomes an irritant.

The effect of irritation on the mucous membrane is to exhaust its natural sensibility, and leave it in a state of languor and feebleness not easily removed by stimulants; hence, irritation often repeated, or long-continued, depresses the vital power of these organs. The late Dr. Cragie, of London, England, enumerates five different sorts of irritation of the mucous membrane:

1. Irritation of the mucous tissue proper.
2. Irritation of the mucous follicles, or crypts.
3. Irritation of the vessels distributed to the mucous follicles.
4. Irritation of the nervous filaments accompanying the arteries.

5. Irritation of the muscular fibers subjacent to the mucous tissues in the compound organs.

The particular forms of irritation which seem to be very often, if not always, distinguishable in actual experience are, the irritative state of the mucous tissue, and the irritative state of the sub-mucous muscular tissue.

Irritation, continued excitation of a healthy part, at last produces inflammation, by exhausting that nervous influence which gives the capillaries power; thus they become weakened, allow of over-distension, and the part is in a state of inflammation or congestion.

As soon as inflammation commences, an organic change takes place in the parts affected, and the removal of the cause of inflammation would not, as in simple irritation, immediately repair the effect, since time would be required for the vessels of the parts affected to regain their normal state; and the longer these parts have been subjected to the morbid influence, the longer will it be before they can be restored to their healthy condition.

Inflammation, like irritation, may attack any part of the structure of the mucous membrane

separately, but it may be conveniently divided into three kinds:

1. Inflammation of the mucous membrane itself.
2. Inflammation of the mucous follicles.
3. Inflammation of the subjacent tissues.

Inflammation of the mucous membrane itself is usually spreading and diffusive; it may commence in a small part of a mucous membrane, and extend itself till it covers the whole surface.

Inflammation of the mucous follicles, on the contrary, is circumscribed in its action; but it not unfrequently happens that, in inflammation of the mucous surface, the follicles also become involved in the morbid process, and, in this case, after the inflammation has ceased in the surface, it continues in a chronic form in the follicles. There is always a tendency in follicular inflammation to spread to the subjacent tissues. After inflammation has continued for some time in a mucous membrane, certain morbid lesions take place in it; one of these, which is very commonly observable, is a morbid thickening of the part affected, and its surface often presents a granular appearance, instead of the softness and smoothness which are the characteristics of its healthy condition.

It must always be borne in mind that pain is not felt in proportion to the degree of inflammation or irritation present in the mucous membrane, but the existence of these morbid actions is indicated by other symptoms, as, for example, when inflammation of the bronchial membrane produces cough, or an increase or diminution of secretion. The effect of inflammatory action is to alter the secretion of mucous. This may be either increased in quantity, or it may become thinner, thicker, irritating, puriform, or even bloody.

By way of recapitulation, and for the purpose of impressing strongly upon the mind of the student the vital importance that must be attached to the obtaining and preserving of a healthy mucous membrane, let me repeat, therefore, that the mucous membrane, commencing at the mouth, at the junction of the skin with the red tissue of the lips; it passes inward to line the mouth, and enters into all the salivary glands, giving off delicate prolongations to the different nasal cavities, the cells and sinuses in the upper jaw, os frontis, and the other bones of the cranium and face which are subservient to the senses of hearing and smell.

In the pharynx, it becomes continuous with the

mucous lining of the eustachian tubes, and through them enters the tympanum as its investing membrane, covering the small membranes which invest the ear, and also the external membrane of the drum; finally, this part of the membrane spreads itself out on the surface of the mastoid cells, behind the organ of hearing. Passing downward from the throat, its track admits of two important divisions. The one entering the glottis runs down the trachea and bronchial tube, dividing and subdividing to an infinite extent, to line those innumerable cells, in which the vital properties of the air become imparted to the blood, as it flows through the lungs. The other division, or the intestinal mucous membrane, continues down the gullet to the stomach, contributing greatly to the ruga of that organ, and becomes the seat of the secretion of the gastric juice, the bile, pancreatic fluid, and of the multitude of minor glands with which the intestinal tube is everywhere studded. Finally, it terminates at the anus, where it again becomes identified with common integument.

On considering the immense extent of this continuous mucous surface, its ramifications throughout cells, tubes, canals, reduplications and convo-

lutions, in an almost infinite variety of arrangement and form, the principle of sympathy between one organ and another may be readily understood, and a valuable guide this principle is, in enabling the orator or vocalist to preserve a healthy voice.

On this continent, healthy voices are rare—vitality seems below par among nine tenths of speakers and singers. The physiological reasons are given in Lecture First.

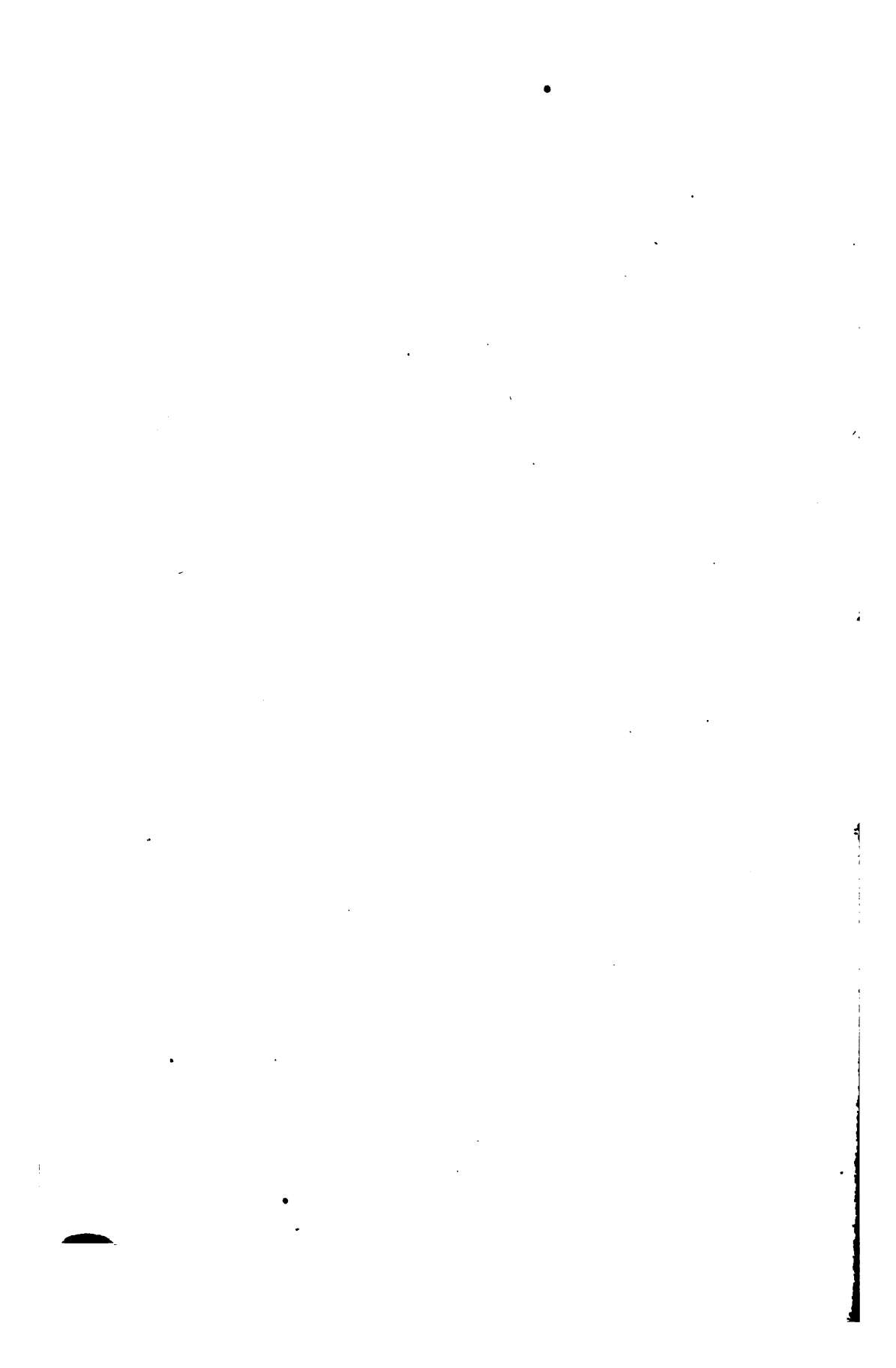
Thirty years ago, I remember listening with astonishment and admiration to the masterly oratory of Henry Clay. He made his manly voice ring in the ears of more than fifty thousand people. Every vowel sound, as it issued from his mouth, was prolonged in a quasi singing style, such as the French orators employ, and the shape of the vowel was carried as far as there was sound to bear it along. Henry Clay was not an intense speaker, yet his prolonged parliamentary intonations traveled like the wind, and that, too, without much apparent driving force. Every inch of his membrane,—*phonator*,—seemed resonant,—a mighty sounding-board, equal in point of surface to the sounding-boards of twenty-five concert grand pianos.

On several occasions, I have made my own voice distinctly heard above the din of twelve hundred voices — seventy orchestral instruments, together with the ponderous tones of the great organ, at the Music Hall, Boston. The task was, by no means, a difficult one. My vocal intonations were prolonged by intensified expiratory breathing, some sounds lasting from twenty to thirty seconds, and steadily sustained. This was an achievement of art, — a “*savoir faire*.”

Heavy, belching, throat-toned voices neither penetrate nor carry; they may seem massive to a listener close by, but, at a distance of some fifty feet, all vocal effects, or embellishments, seem confused,—in short, the amount of art employed by the vocalist amounts to nothing,—he, in the estimation of the audience, becomes as a dead letter.

To make the voice travel, requires the employment of much *scientific skill*, by what may be called “vocal preparation;” but, even presuming that we have mastered the art of speaking or singing, of what use will it avail us, unless we possess a perfectly healthy mucous membrane? When this membrane is in health, so is every internal organ

of the body, and so is the voice, for the voice is vital, like the organs which produce it; and, just in proportion as its producers possess vitality, all things being equal, so shall the voice possess vitality,—a strong, healthy body, a strong, healthy voice, both of which proceed, in the main, from a healthy mucous membrane.



VOCAL REGISTERS.

Register :—A term applied to the compass, or graduated notes of a voice. A series of notes, exactly similar *in quality*, in the voice, or any instrument.—*Moore's Encyclopedia of Music*.

To say that all of the intonations pertaining to the entire compass of one voice are dependent upon a particular set of works, mechanism, or machinery, as you may choose to call it, is nothing more or less than a positive avowal, or acknowledgment, of ignorance, of the common anatomy and physiology of those organs, or parts, which make up the “stupendous whole” of the one great Divine machine.

A scale, or series of sounds or intonations, belonging to and depending (for their production) *upon* the physiological functioning of the *sub*-portion of the vocal machine, must be called, or styled, the laryngeal register, because its mechanism is limited, and only capable of producing a certain number of sounds, consisting—“*per se*”—

of not more than one half the entire compass of the vocal scale.

I may be asked why I call it the laryngeal register. My reply is, that the *larynx*, *lagux*, or *whistle*, being the "*caput*," or head of the lower register, deference therefore is given to that appellation of the compound organ,—the larynx,—and for no other reason, that I can understand.

Now, then, when the larynx has attained its highest point of ascent, the natural diapason of the voice is pushed to its utmost *portee*, or bearing point, and the vocalist is obliged to have recourse to another species of voice, entirely dependent upon another machinery, whose anatomical conformation and physiological functioning are not only diametrically opposite, but entirely different, to that of the anatomy and physiology of the laryngeal mechanism.

The point of departure of this new series of sounds, takes place after the last note of the laryngeal register, that is to say, from the first to the second, and may be carried from an octave to an octave and one half higher, according to the anatomical conformation.

I may be asked, if I admit of a new mechanism

for the formation of higher or more acute sounds when the larynx is elevated to its highest point of muscular construction, *what* do you call the organ which participates or takes part in the production of these superior, or upper intonations?

Permit me to say that those intonations, dependent upon what are vulgarly called head voice tones, are due exclusively to a *forced* contraction of the superior part of the vocal apparatus; for a fuller comprehension of our ideas let us remember, or bear in mind *that* which takes place when the larynx and glottis, so-called, have attained their highest point of contraction and elevation of which they are susceptible, and favorable to the production of acute laryngeal sounds. Elevated by the contractile means of the following muscles: the *thyro-hyoid*, *genio-hyoid*, *mylo-hyoid*, *stylo-hyoid*, *digastricus*, *genio-glossal*, *hyo-glossal*, and, in fine, the inferior *constrictors* of the pharynx, the vocal instrument is fixed, or held, and restrained by the action of the lateral *hyo-thyroid*, the *hyo-arytenoid*, oblique and transverse, and the inferior and superior *thyro-arytenoid* muscles; at the same time the pharynx contracts and shortens, the veil of the palate spreads itself elevatedly, so

names as to close up completely the orifices of the posterior nerves; the uvula, or central pendulous portion of the soft palate gradually becomes obliterated, as the voice ascends, or in proportion to the ascent of the voice; the tongue becomes contracted, and elevated at its base, by the contraction of the *glosso-staphyline*; the anterior and posterior pillars of the palate approach each other closely, with well-defined edges; the tonsils become tumefied and forced out; the isthmus of the throat is shortened; in fine, no portion of the vocal sound issues through the nose, but is made to *phonate* in the mouth, which sound has been produced by breath, issuing forth in thread-like shape:—the apex of the breath strikes a new glottis, formed by the veil of the palate, the base of the tongue, and all the other organs contract and approach each other in a manner we have just indicated; and for this reason it is physiologically impossible for vocalists to mould vowels artistically, however much consonant articulation they may possess.

It is the form or shape of the vocal tunnel which seems to show a change in the laryngeal voice; this tunnel has two external orifices, viz., the nose and the mouth; it is shortened superiorly, whereas

in the faucette voice there is but one orifice, possessing a straight vertical direction, favored or accomplished by the elevation of the larynx, the head slightly thrown back. This action or movement facilitates all unnecessary contraction of the organs, and thereby prevents a vocal *sortie*, or going out through the nasal sinuses.

In fact, in the laryngeal register the bucco-pharyngeal chamber—forms two hollow cones, the bases of which are turned toward the glottis; their apices are separated one from the other, and situated anteriorly:—on the other hand, in the voice of the second register, the mouth and pharynx form but one cone.

Take a tube, ranging in point of size from a number four to a number six female catheter; attach to the outer end a rubber bulb, large enough for the hand to grasp, which bulb is supposed to represent an artificial lung; introduce the catheter straight along the floor of the nasal chamber until its apex touches the posterior wall of the pharynx; exercise a gentle pressure on the bulb, and as soon as the cold column of air issuing from the bulb shall be felt, suspend respiration, and put into movement the organs of speech in the same man-

ner as you would do in employing the breath from the lungs, then your speech or articulation will issue in grave tones. By this experiment, you will distinctly hear all the elements of *aphonic* speech.

The above idea I got from a communication addressed to the Academy of Sciences, Paris, in 1829, by the ingenious physician, Dr. Deleau, in which he says: "Fearing lest I might have abused or misused the faculty of interrupting the action of the chest while bringing into play the organs of speech, I made an effort to speak audibly with the lung voice; the current of air established through the nose by means of the artificial lung being at the same time in full force, at that moment two words were made heard in a manner so distinct and pure that those persons present at the *seance* were under the impression they heard two individuals repeating the same words and phrases."

Colombat de L'Isere remarks that the experiment seemed to him so conclusive, he at once determined to try the same upon himself, which he did; but in advance of Deleau, for he managed to produce *two* distinct notes at the same time,—one purely laryngeal, and the other purely pharyngeal, an octave apart. I have performed the same ex-

periment, repeatedly, upon myself, in the presence of my classes in Organic Elocution, with the most satisfactory results.

By this experiment, or test, we have proof conclusive that the larynx has nothing to do,—in fact, is good for nothing in aphonic speech, or the upper register, or pharyngeal-diapason.

For the present, I will here rest further discussion on the registers of the voice, by simply expressing a fact, which should be kept or borne in mind, that all that belongs to, or comes within the reach of man is either positive or negative,—thus:

<i>Positive.</i>	<i>Negative.</i>
Health.	Sickness.
Strength.	Weakness.
Love.	Anger.
Light.	Darkness.
Beauty.	Ugliness.
Cleanliness.	Dirtiness.
Soft.	Loud.

etc., etc., and of the human voice,

Laryngeal. Pharyngeal.
yet we have their compounds in various combinations; for example, we can truthfully say:

1. The Bronchial register proper.

2. The Bronchio-tracheal register.
3. The Tracheal register proper.
4. The Tracheo-laryngeal register.
5. The Laryngeal register proper.
6. The Laryngo-pharyngeal register.
7. The Pharyngeal register proper.

These combinations, I propose to discuss at length in the next edition of this work.

In concluding this chapter, permit me to relate the following interesting fact. In the year 1850, I became a resident of Rio de Janeiro, and there received through the hands of Signor Francisco Manuel da Sylva (Maestro di Capella), by imperial order, a commission to serve as *Primo Basso Assoluto* of the Imperial Chapel. This position I occupied for nearly four years, exercising and displaying my voice on days of "great gala," in the presence of H. I. M. Dom Pedro II., Emperor of the Brazils; also, H. I. M. Donna Theresa, Empress of the Brazils, together with the nobility of Rio de Janeiro, and certain foreign ambassadors. The Chapel choir was composed of male voices entirely. The leading voices were what should be properly called pharyngeal, and not counter-tenors, as English writers are pleased to style them.

These singers were old men, who at their prime of life had been noble bassi. As the upper tones of their laryngeal voice began to weaken, the maestro, F. M. da Sylva, put them on their A B C of vocal music, *in the pharyngeal* voice, just as if they had never exercised a scale in their lives before. The result was that in the course of six months of daily study these same bassi were transformed into beautiful treble voices, possessing a range of nearly two octaves; their tones rich and full, and their execution equal to that of any flexible soprano; executing scales and runs, diatonically, chromatically; trills,—in fact, *florituri* of every description. This is no exaggeration, as I can refer to the Hons. Robert C. Schenck and Edward Kent; the former, American Minister, from Ohio; the latter, Consul, and formerly Governor of the State of Maine; both gentlemen being in the habit of occupying a seat in the ambassadors' balcony, to the left of the altar, and immediately above their Imperial Majesties. I need not add that the vocal effects produced in that Chapel have never been surpassed, nor seldom, if ever, equaled.

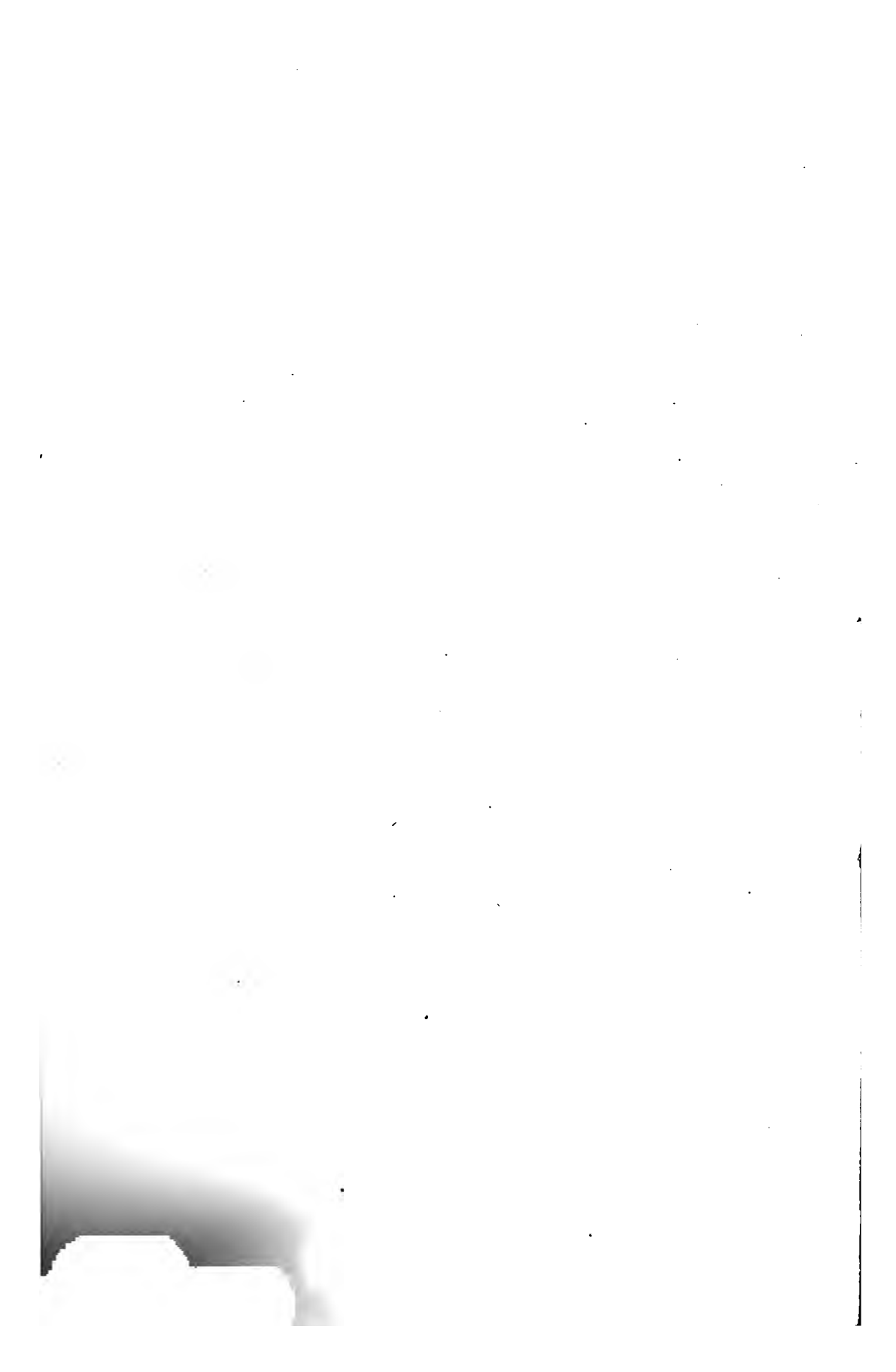
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PARAGRAPHS.

"Seek, and ye shall find."

"ERIC, KING OF DENMARK, surnamed the Good, when he was returned into his kingdom, and held his yearly assembly, was greatly pleased with the industry both of his soldiers and artificers. Among others of his attendants was a musician, who asserted that, by the power of his art, he was able to excite in men whatsoever affection he thought proper, and to make the sad cheerful, the cheerful sad, the angry placid, and such as were pleased discontented, and even drive them into a raging madness; and the more he insisted on his abilities, the greater was the king's desire to try them. The artist now began to repent his having thus magnified his talent, foreseeing the danger of making such an experiment on the king; but the more desirous he was to evade the trial of his skill, the more the king insisted on it. When the musician perceived that he could not be excused, he begged that all weapons capable of doing mischief might be re-

moved, and took care that some persons should be placed out of hearing of the cithara (harp or lyre), who might be called in to his assistance, and were, if necessity required it, to snatch the instrument from his hands and break it on his head. Everything being thus prepared, the citharist (player on the harp or lyre) began to make proof of his art on the king, who sat with some few about him in the open hall. First, by a grave mode, he threw a certain melancholy into the minds of his auditors; but, changing it into a more cheerful, he converted their sadness into mirth, that almost inspired them to dancing; then, varying his modulation on a sudden, he inspired the king with fury and indignation, which he continued to work up in him, till it was easy to see he was approaching to frenzy. The sign was then given for those who were in waiting to enter: they first broke the cithara, according to directions, and then seized on the king; but such was his strength that he killed some of them with his fist; being afterwards overpowered with some beds, his fury became pacified, and, recovering his reason, he was grievously afflicted that he had turned his wrath against his friends."—*Soto Gram-*

maticus, in Hist. Den. Edit. Basil, lib. xii., p. 113.

"MUSIC IS DESIGNED for nobler purposes than merely to please the ear; she is intended to speak to the judgment. But, unaided by good poetry, her spell is partly broken, and the bright wreath of her fame droops and withers. Pure composition unites music and poetry in indissoluble bonds; and so intimate is their connection, so equal their value, so indispensable the strictness of their union, that the rules of sense and propriety render them the echo of each other; but, should we feel disposed to show a preference to either, it would be on the side of poetry, to which, in the strictness of justice, the true object of composition should render music, in some degree, subservient. It is to a departure from this legitimate purpose of composition, that music is indebted, at present, for the decline of her influence over the passions. Serious mischief, also, originates with teachers who take upon themselves the title of *masters*, or *professors of singing*."

"So modern 'pothecaries taught the art
By doctor's bills to play the doctor's part;
Bold in the practice of mistaken rules,
Prescribe, apply, and call their masters fools."

—*Pope's Essay on Crit.*

The science of singing is often adopted as a profession by those who, after a few months' instruction, fancy themselves fully adequate to impart their knowledge, under the form of lessons, to others. Like the stage, singing is frequently embraced as a profession when all other resources fail; and thousands are weak enough to imagine that two of the most difficult sciences are to be learned almost in a day. Can we, therefore, be surprised that so many singers fail to arrive even at mediocrity, when the very gifts that nature has bestowed on them are perverted by the bad instruction which they receive?

Every one teaches, says Tosi. I do not mean the first rudiments only,—that would be an affront to them. I am now speaking of those who take upon them the part of legislator in the most finished part of singing. So mischievous a pretension prevails, not only among those who can barely be said to sing, but among the meanest instrumental performers, who, though they never sung, nor knew how to sing, pretend not only to teach, but to perfect, and find some who are weak enough to be imposed on.

Musicians among the ancients were poets, phil-

osophers, and orators of the first class. And it seems, says Rousseau, that to mount to elevated expression in oratorical and imitative music, the human passions and the language of nature must have been made a particular study. However, the musicians of our times, bounded, for the most part, by the practice of notes and a few passages, will not, it is hoped, be offended if we should not hold them to be great philosophers.

Boethius would not honor him with the name of musician, who, in a servile manner only, practiced music mechanically with his fingers or voice, but the man alone who possessed the science of music by reason and speculation.

The task of a professional singer is much more difficult than that of an actor; and his success, therefore, merits far greater commendation. The latter, when arrived at any degree of eminence, is not expected to move out of a certain sphere in his professional duties; but the former, if aspiring beyond mediocrity, is called upon for the delineation of all the passions in the various departments of the science, for elocution is quite as requisite in singing as in acting.

Ambition is the rock that proves fatal to many;

- all aim at being great, without considering whether nature has endowed them with the means; and they imagine, if able to execute a few cadences, that the important task is accomplished. This is, indeed, attempting to reach the summit before they have attained a firm footing on the base; and, after climbing a few steps, they sink into the abyss of oblivion, which their own conceit, or the folly of misjudging friends, has prepared for them.

PURE TONE is the most essential requisite in singing; it is the vehicle of every other beauty in the science; execution, elocution, and expression are all subservient to tone, for without its aid they would be as nothing. Quality more than quantity of tone should be the chief consideration. A judicious singer, with even a weak voice, will frequently, from nice management, excite more pleasure than another whose magnificent volume of tone leads him to loftier flights.

In conversation, we generally attach the word *little* to all things of endearment; largeness of figure, in fact, all that partakes of greatness, whether in inanimate or animate nature, gives us an idea of power and force. So it is, also, with loudness of tone; but it is the soft, sweet, gentle,

and delicate strain that, claiming our protection, rivets our attention and love, and steals our souls into forgetfulness.

Gravity of sound fills the mind with religious reflections, and a moderate excitement of pleasure, that, like friendship, is equable, temperate, and of long duration. Every passion partaking of violence, whether arising from joy, grief, or rage, must soon exhaust itself from its own intensity. Grave and protracted sounds are dignified and solemn, and are particularly effective in sacred music. Grave sounds, swelling into loudness, and then slowly dying on the ear, partake more of the sublime and holy than any other.

“All music that paints *nothing* is only *noise*; and were it not for custom, which *unnatures* everything, it would excite no more pleasure than a sequel of harmonious and finely-sounding words, without any order or connection.”—*Pref. de L'Encyclopedie*.

“Those airs alone remain forever engraven on the memory of the public, that paint images to the mind, or express the passions, and are, for that reason, called the speaking airs, because more congenial to nature; which can never be justly imitated but

by a beautiful simplicity, that will always bear away the palm from the most labored refinement of art."

—*Algarotti*, p. 49.

"From the proper disposition of single sounds, results that harmony that adds force to reason, and gives grace to sublimity; that shackles attention, and governs passion."—*The Rambler*, 97.

In every language, all the passions of the mind are expressed, and almost understood, from the mere effect of sound, whether joy, grief, rage, or fear. The necessity, therefore, of cultivating tone, so as to produce effect and meaning from mere sound, is obvious.

The Abbe Morelet, a man of great erudition in France during the last century, in his ingenious pamphlet, "On Musical Expression and Imitation," published in 1759, says: "That music, executed by the same organs with which the language is spoken, and aiming at the same sense, becomes itself a language." This elegant writer farther says, that "A beautiful and pathetic air is the collection of a multitude of accents escaped from souls of sensibility, as the features of Venus have existed separately, but never together. The sculptor and the musician write these dispersed fea-

tures, and give us pleasures which truth and nature never gave."

IT SHOULD BE an object to sound a note as softly as possible before any of the breath expires, gradually increasing the sound to the fullest extent of the voice, and diminishing it in the same ratio until it is scarcely perceptible to the ear. To impress the idea, it would be well to bear in mind the gradual manner in which the sense of hearing is affected by a band of fine music at a distance. The sound is at first indistinct, but sweet; slowly advancing, it is by degrees more powerful, until it rises full on the ear; and reaching us closely, its effect becomes brilliant. Having swept by us, the brilliancy diminishes; then, gradually dying away, its softer tones only are heard; and finally, the remembrance of its sweetness is all that is left. We then wish for its renewal with as much eagerness as we desired its approach when the earliest tones only were heard.

It is not proper to take breath in the middle of a word, whether it be of one or more syllables; nor upon any occasion more frequently than is absolutely necessary.

Breath should be taken with care at the com-

mencement of a long division of notes, cadence, or pause, that the effect of the music may not be destroyed by stopping in the middle for that purpose.

As it is beneficial to quit a meal before the appetite is palled, so are singers recommended to keep a reserve of breath, that they may seem as if they had a little to spare after concluding a note or passage, and not leave the unpleasant impression of having arrived at their last gasp; for those who are too lavish in forcing, or throwing away their breath at the commencement of a note, lose all self-command before the termination, and the voice, instead of continuing firm, sinks into the querulous tone of extreme old age.

BY INTONATION, is meant the art of sounding every note exactly in tune, with facility and precision. In this branch of the science, the singer must depend solely on the correctness of his own ear, as instruments, from various causes, are frequently out of tune. Correct intonation is indispensable. Execution, volume, brilliancy of voice, and even the attempt at expression, will not compensate for deficiency in this requisite. I say, attempt at expression; for there can be no true ex-

pression where the singer's intonation is imperfect, and, in consequence, incapable of expressing the various sounds necessary to produce effect in describing the different passions.

The unpleasant sensations excited by singing out of tune are not confined to the ear of the scientific only; all who listen are more or less affected by the discordancy.

Singing *too sharp* is generally the criterion of a bad ear. I will admit the inference to be just, where it is invariably the case; but novices, from want of proper knowledge of the distances, and how to portion out their breath, may occasionally fall into this error for a short time; fright may decidedly produce this defect at the moment, but these are the only causes where a palliation for so serious an offence can be offered.

Singing *too flat* proceeds from many causes, without the ear being defective; such as exhaustion of frame, fatigue, indisposition, or weakness. Vocal performers possessing the greatest knowledge of the science, and the utmost accuracy of ear, frequently afford us instances of this error, from such causes.

They who have not had the advantage of mix-

ing with musical society are often unjustly condemned as having imperfect ears, when, in reality, they are only uncultivated, from want of proper acquaintance with musical sounds. We do not expect a peasant to enter a drawing-room with all the politeness of a courtier, yet he may possess talents that require but few years' study and observation to render him as bright an ornament as the most polished of the party. The children of musicians seldom require half the trouble to become proficient in the science of music that is necessary with other children, because the ears of the former are imperceptibly cultivated by constantly listening to the compositions of the first masters, ably executed. But let these children be placed where the sound of music seldom, or never, reaches them, and I question whether they would not have to combat with the same disadvantages in *educating* their ears as the latter. The musical student should, therefore, bear in mind that it is greatly in his own power to facilitate the cultivation of his intonation, by constant and assiduous practice of the diatonic, chromatic, and enharmonic scales, by which application, joined to frequently attending concerts, and other places where the best music may be per-

formed, that swelling and dying of the voice, and that accuracy of intonation, can alone be acquired, which, in both vocal and instrumental music, evince the skill and taste of the performer.

Perseverance and industry, as far as the mechanical instruction of the ear is concerned, joined to a familiarity with good compositions, are the certain road to success and pre-eminence.

Some years since, it was considered a work of labor and importance to bring forward singers combining all the requisites to enable them to pass victoriously through the ordeal of public opinion. They toiled assiduously up the hill of science, patiently enduring the drudgery ere they presumed to pluck the flowers which bloomed as the reward of their industry; but, in the present day, singers spring up like mushrooms, after a few months' instruction, and then, unable to stand the test of criticism, they sink into oblivion.

One road is open to all who wish to excel, by which even an indifferent voice may be rendered good. I mean the *serious* practice of the *plain scale* (that is, the *diatonic scale* in the simple state, free from shakes or graces of any kind,) together with the *chromatic* and *enharmonic*

scales; without which application to the most exact nicety, no singer can possibly arrive at any degree of perfection. It is the firm basis on which all the progress to future excellence must be established. Grandeur, power, roundness, sweetness, and steadiness of tone, all depend on this practice. Execution, and the lighter branches of singing, are but pleasing auxiliaries, called in to afford a little relief by playful variety; and yet this simple practice, on which so much depends, is passed by with careless indifference, for the sake of a pretty melody, which, tickling the ear, induces the singer to desert the straight and certain path to perfection.

It is advisable, before the *chromatic* or *enharmonic* scales are attempted, that the student should first make himself proficient in the practice of the *diatonic* scale, to sound therein every note with truth, clearness, and decision, as well as with perspicuity, and to give that richness and liquid softness to each sound which must ever delight.

After acquiring that priority of intonation and firmness of tone so desirable on holding notes, and the art of protracting or contracting at will the duration of each sound in the ascending and descending scale with equality and steadiness of

voice, which will enable the singer to depend on his own strength, the different distances from one sound to another may then be attempted with the same caution and perseverance.

THE OLD ADAGE, that a house without a good foundation must fall to the ground, is not inapplicable to the foundation or building of the voice; for, if the more substantial sounds (the lower tones) are not carefully cultivated, there can be no dependence on the upper tones; they will be uncertain both in strength and truth of intonation, on the principle of violin harmonics.

The common pitch of tone in which we converse lies within a very few notes of the deepest or gravest sound in our compass, to which the falling inflections often descend; but allowing even for the various modulations so necessary to prevent monotony in speaking, the rising inflections never, by many notes, ascend to the highest (most acute) sound. Nature, therefore, dictates that, before our acute tones are made of any consideration, that part of voice which is so necessarily essential for general use, the lower tones, should be first cultivated. Let, then, the following method of forming or building the voice be adopted.

It is advisable to commence from any grave sound within three or four of the lowest compass, and to practice that sound until a certain degree of softness, mellowness, steadiness, roundness, fullness, and richness can be given to it at will. Make that sound the tonic (the key-note) of a diatonic scale. The voice may then ascend to the second and third of the scale, and be exercised in the like manner as on the first, so that the three tones are made equal in their bearings and qualities. One half tone higher may afterwards be attempted, which will be the fourth note of the diatonic scale; and by the same means the voice may exercise itself, step by step, until the next four tones, which complete the octave, are gained with the same equality of the tone as the preceding four.

Thus, having cultivated eight sounds (which may be considered about the middle part of the voice), and gaining thereby a substantial basis, or ground-work, the student may with safety extend his compass either above or below, proceeding slowly, but securely, in his progress. But, in extending the compass, care should be taken to discover which way the voice inclines; for, as we would with caution feel our way in a dark and un-

known road, so, in extending the voice, it is necessary to cultivate those high or low sounds that are most pleasing to the ear, and on which we may with firm confidence rely for truth of intonation.

It would be well to bear in mind that the longer a violin has been in good use, the sweeter and fuller become its tones; by proper exercise do the vocal organs in like manner improve in mellowness and power.

If injudicious teachers, by imprudent exertions, strain youthful voices, then, indeed, their tones become harsh and discordant, like those of a wind instrument that is over-blown. Under such tuition, it would be best that children should not begin, either early or late.

About the age of fifteen or sixteen, and in some instances sooner, the voices of both sexes undergo a material change with the constitution; when that of the female, if properly managed, imbibes the rich, full tone of womanhood; but if too much exerted while in an uncertain state of health, it becomes harsh and discordant.

Boys, before arriving at manhood (often from neglect of the master, as well as from their own imprudence in straining their voices at the time of

changing or breaking,) entirely lose all power of singing, and it frequently happens that they never regain their musical tones, nor the least trace of ever having possessed them.

A good old master has (no doubt to prevent injurious practice) recommended that boys should not sing at all from the time when their voices break until the tones are fixed. The change that takes place with the constitution in male voices is very different from that of the female. The latter only loses a particular thinness of sound, common to very youthful voices, and gains in its place a full, rich body of tone, which, from ill-management, is often turned into that harshness before noticed. But the male entirely loses his upper notes, and gains a deeper compass of an octave or more below. It is then when the master's ability should be exerted by transposing his pupil's songs and exercises, so that his voice shall be, by degrees, lowered in pitch, as the acute tones fall off. It is his duty to be on the watch for every change; and, as the upper notes get defective in the smallest degree (cracked or uncertain), their compass should be lowered by half a tone at a time, until the voice has become fixed. By such means, boys would

never entirely lose their vocal powers, nor should we have to lament the great scarcity of male singers.

That part of the throat where this change takes place is, by the Italians (according to Dr. Burney), called *il ponticello*, "the little bridge." The *voce di petto* (laryngeal), and the *faucette* (pharyngeal), may justly sing the praises of this *little bridge*, should they go smoothly over it.

There is a break, more or less, in the voices of both sexes, but particularly in that of the male, between the laryngeal and pharyngeal. It should here be an object with the singer to contrive to blend or dove-tail the two qualities of tone in such manner that the transition from one to the other may not be perceptible to the ear; and, inasmuch as there are no two vocal conformations alike, the only physiological rule that can be laid down is simply this: If the break be very rude, bring the pharyngeal register, beginning some four or five notes above the break, *down* some four or five notes *below* the break, and dove-tail accordingly, gradually working one set of registral muscles into the other, until they shall have acquired full strength.

SWELLING AND DYING of the voice is the most important to practice, and one of the easiest requisites to acquire, if judiciously treated; on it depends the principal art of singing, for its sweetness enriches and gives that delicious roundness and fullness to the tone, so desirable for every branch of the science.

The invalid, by daily and cautiously prolonging the distance of his walk, gains that bodily strength and command of breath which at length enable him to undertake a long journey; from which the singer may, by comparison, see the necessity of practicing the *crescendo* and *diminuendo* progressively; that is, by daily increasing the force of his voice, and in like manner by degrees prolonging the duration of sound on holding notes, to gain such magnitude of tone and command of breath as will enable him to increase and decrease the sound of a note at pleasure, either in protracted duration of "sweetness long drawn out," or to apportion the same degrees in rapid alternation. •

The following quotations cannot fail to inspire the student in elocution with a just idea of the sublime beauty and enchanting effect that is cre-

ated by the various swellings and dyings of the voice.

——— Soft as evening dews
Sinks in the heart, and all the soul subdues ;
Sweet as Æolian sounds, that gently rise,
As blows the fragrant breeze, or languid dies ;
Now tremulously sweet the zephyr's wing
Touches with tones of Heav'n the trembling string ;
Now gradual swells, as on the distant shore,
At crimson eve, the crested billows roar.

—*Rome, part i., line 344.*

Then rising all at once, was as the sound
Of thunder heard remote.

—*Milton, book ii., line 476.*

Rose like an exhalation, with the sound
Of dulcet symphonies and voices sweet.

—*Book i., line 549.*

——— A shout,
Loud as from numbers without number, sweet
As from blest voices, utt'ring joy.

—*Book iii., line 346.*

Ring out, ye crystal spheres,
Once bless our human ears
(If ye have power to touch our senses so)
And let your silver chime
Move in melodious time,
And let the bass of Heaven's deep organ blow,

And with your nine-fold harmony
 Make up full consort to the angelic symphony.
—*Ode.*

Mountains, and ye that warble as ye flow,
 Melodious murmurs, warbling, tune his praise.
—*V. 195.*

That strain again ; it had a dying fall ;
 O, it came o'er my ear like the sweet south,
 That breaks upon a bank of violets,
 Stealing and giving odour. —*Tempest.*

Where should this music be ? i' the air or the earth,
 It sounds no more ;—and sure it waits upon
 Some God of the Island. —*Tempest, act i.*

At last, a soft and solemn breathing sound
 Rose like a stream of rich distill'd perfumes,
 And stole upon the air, that even silence
 Was took ere she was 'ware, and wished she might
 Deny her nature, and be nevermore
 Still, to be so displaced. I was all the ear,
 And took in strains that might create a soul
 Under the ribs of death. —*Comus.*

And ever against eating cares,
 Lap me in soft Lydian airs,
 Married to immortal verse,
 Such as the melting soul may pierce,

In notes with many a winding bout
Of linked sweetness long drawn out.

—*L' Allegro.*

Pleasant is the voice of song ; it comes on the sound of the
stream along the narrow vale.—*Ossian.*

— Her voice was like the harp ; when the distant sound
comes in the evening, on the soft-rustling breeze of the vale !
—*Ossian.*

— How often from the steep
Of echoing hill or thicket have we heard
Celestial voices to the midnight air,
Sole, or responsive to each other's note.
—*Milton, iv., 680.*

There let the pealing organ blow
To the full-voic'd choir below,
In service high, and anthems clear,
As may with sweetness, through mine ear,
Dissolve me into ecstasies,
And bring all Heav'n before mine eyes.
—*Il Penseroso.*

For mine is the lay that nightly floats,
And mine are murmuring, dying notes
That fall as soft as snow on the sea,
And melt in the heart as instantly !
And the passionate strain that, deeply going,
Refines the bosom it trembles through,

As the musk-wind, over the waters blowing,
Ruffles the wave, but sweetens it too !

—*Lalla Rookh*, p. 318.

'Tis I that mingle in one sweet measure,
The past, the present, and future of pleasure ;
When memory links the tone that is gone
With the blissful tone that 's still in the ear ;
And Hope from a heavenly note flies on
To a note more heavenly still that is near.

—*P.* 319.

And when he hears the rude, luxuriant note
Back to his ear on softening echoes float,
Believes it still some answering spirit's tone,
And thinks it all too sweet to be his own !
—*Moore's Epistles, Odes, vol. ii., p. 140.*

How quick expression darts her glancing fires,
How deep responding blend those hues and tones,
Which harmony itself enchanted owns,
All judgment sanctions, and all taste admires.

—*Gent's Poems*, p. 139.

'Twere but the echo of the parting breeze,
When Zephyr faints upon the lily's breast ;
'Twere but the ceasing of some instrument,
When the last lingering undulation
Dies on the doubting ear.

—*Smart.*

—— The grateful notes prolong,
Apollo listens, and approves the song.

—*Homer's Iliad, book i.*

—— And rapid urge the way
Till dying off the distant sounds decay.

—*Homer.*

And her voice was the warble of a bird,
So soft, so sweet, so delicately clear,
That finer, simpler music ne'er was heard,
The sort of sound we echo with a tear,
Without knowing why—an overpowering tone,
Whence melody descends as from a throne.

—*Don Juan, canto ii., p. 194.*

Like to a harp-string stricken by the wind,
The sound of her lament shall, rising o'er
The seraph voice, touch the Almighty mind.

—*Prophecy of Dante, canto iii.*

Hark! through the calm and silence of the scene,
Slow, solemn, sweet, with many a pause between,
Celestial music swells along the air.

—*Montgomery's Greenland, canto i.*

And thy voice of music cease, like the murmurs of the even-
ing breeze,

That die away in the silence of night.

—*Ossian.*

EXECUTION is a term used to signify facility of

voice in running through difficult divisions, and other intricate passages, with rapidity.

Execution is certainly one of the most difficult parts of musical science. Young singers are desirous of attaining it without reflecting whether, from the formation of the throat, and various physical causes, they may ever be able to accomplish their wishes. Few indeed possess the power of execution in a pre-eminent degree. It is, in part, a gift of nature. Those who have ever delighted, as well as astonished us, by their rapid manner of running through divisions, must have been naturally endowed with flexible organs.

The hinges of a door, which have continued for years undisturbed, will, when the door is reopened, grate harshly on the ear; but every effort renders the harshness more tolerable, until, from frequent use, they move easily. Thus it is with the voice; on the flexibility of the *uvula*, and the muscles connected with it, depend the perfectibility of both the shake and execution. But still it must be acknowledged that acquired execution never should be exercised by the side of nature otherwise than sparingly, even where necessity requires it; for the latter possesses an easy velocity which can play-

fully sport with its subject at will; but, however gratifying the power of execution may be considered by those who possess it, I recommend them not to be indiscriminately lavish, lest they cloy by too great profusion, and, as Voltaire remarks, "shine in trills and divisions, at the expense of poetry and good sense."

Execution requires a perfect intonation and judicious management. It is, to the singer of true taste, like the bright coruscations of wit in conversation, and does not consist in the mere running of notes, without considering the character of the song. Ornaments should correspond with the character or genius of the piece in which they are introduced. It is in the performer's power to give the cadence intellectual variety by running through the divisions with velocity, force, and brilliancy; now in a light, pleasing, and playful manner; at other times, majestically imposing, or tenderly pathetic, according as the true reading of the poetry requires, that the best effect should be produced. A bad singer, by the introduction of ornaments, commits willful suicide in the attempt.

Execution is capable of grand and noble purposes, but it must not be sported with indiscrimi-

nately. Graces afford pleasure, when rendered subservient to the legitimate sense of the poet and composer, and are as necessary to relieve the ear from monotony in music as is a variety of language to avoid tautology in writing. But as in the latter we would endeavor to select such expressions as are elegant, pleasing, and consistent with the subject on which we write, so should the singer adapt such cadences as are within his unconstrained natural powers to the character of the composition, preserving, as it were, one continual stream of melody, that the composer's ideas may not be destroyed.

EXPRESSION. On the subject of expression, we can scarcely find language sufficiently nervous to impress the singer with a just sense of this invaluable and soul-exciting charm, this mental polish to harmony, which, stealing to the inmost recesses of the heart, fills it with chastened, yet exquisite, sensations of rapture, such as none but the sensitive can feel, and none but the sensitive impart. Judicious expression is the very acme of the art; it is the charm that leads to the highest estimation of the singer, the finishing stroke to the works of the

painter, poet, and musician. This excellence may be acquired by great observation and perseverance, but true expression can only be the result of natural feeling, the child of innate sensibility, instructed by the Muses and the Graces, without whose aid the most perfect voice and rapid execution, though they may astonish for a time, can never reach the heart. An insipid singer, who has not sufficient judgment to vary his expression, may with propriety be compared to a marble statue, the symmetrical proportions of which please the eye, but, wanting the animation of existence, compel us to turn after a while, tired by its inanity, to contemplate a less beautiful object in life.

Expression in music, by her irresistible tenderness, touches the soul. She takes all her colorings from the sense which the poetry conveys, and by that means gains complete possession of the heart. She leaves her competitors to astonish; and travels on, securing the love of all in her progress.

She clothes her song in the characteristic drapery of grace, majesty, and pathos; not a single note will be breathed in vain; she will wisely consider that ornaments should ever be subordinate to

the sense and grand end of the composition, which is to speak to the judgment, as well as to the ears, of her auditors.

It is well known that an actor of merit will often, by a certain facial expression, convey a meaning which the finest flow of language cannot express. He will read, also, in such an effective tone, with such peculiar expression, pathos, and grace, as to produce sympathy, delight, and surprise in an audience, who have for years, perhaps, listened unmoved to the same passages when recited by his competitors.

If monotonous rules are laid down for the expression of *words*, and not *ideas*, the singer and speaker of taste and judgment must remain fettered by custom, without exerting the power to delight by the combination of sense and sound.

Words of joy or sorrow may be expressed by violence or delicacy of sound; but the latter can only proceed (or prove effective) from those who possess that innate sensibility of feeling which *Art* cannot teach.

(" From vulgar bounds with brave disorder part,
And snatch a grace beyond the reach of art."

As joy and sorrow produce similar effects upon

the frame, so will the same strain of music, with words of opposite meaning, act upon the nerves, by exciting pleasurable or melancholy, or *positive* and *negative*, sensations. It is only by contrasting the two that the difference of effect can be judged.

FALSE EXPRESSION, an error into which many fall, is infinitely worse than no expression at all. It renders the most beautiful and pathetic airs ludicrous. We have heard singers, from this affected sensibility, labor as if suffering under the effects of ipecacuanha; and others "tear a passion to tatters, to very rags," without considering the various expressions of which one word will admit. In singing, we often meet with the passion of love, the passion of grief, and the passion of anger; yet, surely nothing can differ more widely than the expression that should be given to each. It is not the word itself, but the sentence, which conveys the import that should direct the judgment of the singer; though it is a singular fact that many who are guided by good sense in reading or reciting, the instant they begin to sing seem to lose all idea that the part is of any consideration.

FACIAL EXPRESSION AND GESTICULATION.

"The grace of action, the adapted mien,
 Faithful as nature to the varied scene;
 Th' expressive glance, whose subtle movement draws
 Entranced attention, and mute applause;
 Gesture that marks, with force and feeling fraught,
 A sense in silence, and a will in thought."

—*Sheridan's Monody on Garrick's death.*

It is to be regretted that singers, both in public and private, attend so little to that most powerful letter of recommendation,—the countenance; for many who, in conversation, are agreeable and animated, no sooner begin to sing than they resemble figures whose mouths, pulled open at pleasure by a string, emit sounds, which, though ever so mellifluous, lose their effect by issuing from such automaton organs. Others, on the contrary, in their desire to avoid the charge of insipidity, so painfully distort their features that they render themselves objects of ridicule or pity. However charmed we may be by a good voice, the *eye*, as well as the *ear*, requires to be pleased; and we insensibly become fatigued and discontented when the countenance and demeanor do not in some degree accord with the subject to which we may be listening.

"'Tis not enough his verses to complete
 In measure, number, or determin'd feet.

To all, proportion'd terms he must dispense,
And make the sound a picture of the sense;
The correspondent words exactly frame,
The *look*, the *features*, and the *mien* the same."

—Pitt.

An expressive countenance is the index of a sensible mind. In public oratory it is esteemed as one of the principal steps towards success, nor is it less essential to the singer than to the actor; for, as songs are generally expressive of *some passion*, singers should endeavor to enter into the subject with sufficient energy to inspire their countenances, and, by thus showing that they feel what they sing, make others feel also.

It is not necessary to look the picture of misery while uttering sentiments of sorrow, nor to wear a broad grin in the expression of pleasure; but if the words and music (which should agree) be of a cheerful nature, no person of the least reflection would sing with a countenance descriptive of despair, nor assume a merry, smiling face if the subject were plaintive and sorrowful. Much depends, also, on the gesticulation of a singer, for we are apt to attach more consequence to manner and external endowments than they really merit.

Suavity of manner and a modest deference, without the admixture of a shadow of servility, are,

both to the singer and the actor, the best passports to the lasting favor of the public; joined to a moderate reliance on their own powers. Conceit and impudence may, with the inexperienced, for a time pass current in the room of more genuine talent. *Politie* manœuvering has frequently carried the day, but the lover of justice and sincerity must always wish the arrogant pretender to be disappointed of the incense which his vanity would lead him to covet.

“Real genius, however conscious of its own strength, rarely vaunts its superiority over inferior satellites, and there are instances in the present day of the best singers, though accustomed to nightly performances, never appearing without a slight sensation of apprehension.”—*Nathan*.

There is nothing more common than the habit of looking wisely up and down to the words *above* and *below*, and of slapping the breast whenever the heart is mentioned, no doubt to make known that it is situated towards the left side, which, in an anatomical point of view, is not strictly true.

“The actor of habit is a gardener, who raises elegant flowers and distributes gaudy parterres, but knows nothing beyond the surface of the

earth. The actor of passion is a miner, who digs into the depth and darkness of creation, and brings to light its most hidden and valuable stores."—*Leigh Hunt's Theatrical Criticisms.*

GESTICULATION. The movements of gesticulation must be either positive or negative. To illustrate, and by way of practice, rotate the forearms, hands, and fingers in a circle towards the body, for *positive* gesticulation; confine the action to the middle of the body for ordinary gesticulatory expression; below the waist for positive, insignificant delineations; and *above* the head for superior, or grand positive effects, just as you would do if called upon to describe the letter O. Then, for the purpose of practicing negative gesticulations, reverse the movements of the arms, hands, and fingers.

A daily practice of this exercise will give grace to the movements of the arms, etc., so that when a positive idea is about to be conveyed, the gesticulation will show it, and all stiffness and exaggeration will be avoided.

No marked gesticulation should be made unless some *climactic effect* is to be produced; then it

must be used quietly, and made to dove-tail with the *tout ensemble*. No one part, or parts, functioning should be allowed to mar the other. Bear in mind,

“ All are but parts of one stupendous whole,
Whose body Nature is, and God the soul.”

—Pope.

To perfect himself in facial expression, the student, by force of mind, must, in the first place, acquire perfect passive immobility of the facial muscles regardless of what may be said or done during this facial expression.

Secondly, the student must, by frequent practice, exercise the contraction of the facial muscles singly.

Thirdly, the student must extend the contractile functioning of one muscle to that of the adjoining muscle, and so on until the gradual contraction of all such muscular control shall have been acquired for the purpose of producing those facial expressions peculiar or pertaining to each and every passion or emotion of the soul.

Few students have arrived at this point of perfection in the art; yet the great actor, Garrick, did it, Del Sarte did it; and to-day the author of this work has so far educated his facial muscles as

to be able to appear as if crying on one side of his face while laughing on the other.

It would be advisable for the student to obtain a large anatomical picture, exposing the superior or outer muscles of the face. Let him place it alongside of his mirror, while studying and exercising muscular contraction, and refer frequently to the mirror for the purpose of satisfying himself, that the required muscle or muscles being involved in the facial expression studied are not interfered with by any direct or indirect action of the immediate connecting ones.

The study is a simple one, interesting, satisfactory, and positively calculated to satisfy him that he is attaining the apogee of the art of mimicry.

The deportment or study of the lower limbs must be as follows: let the student stand erect, heel to heel, the toes diverging at an angle of forty-five degrees; when about to move, flex the right knee without moving the feet; advance the right foot from four to six inches; in this position the student will find himself enabled to semi-rotate his body to the right, until he finds his back where his face was, previous to the exercise; let him return to his former position and practice this exercise

backwards and forwards until he can do it without faltering, after which the other leg and foot may be exercised in a similar manner.

These exercises prepare the student to the employment of his lower limbs and feet for elegant and artistic walking.

Stand erect; heels together; toes diverged; flex the right knee; advance the right foot its entire length; throw the body forwards, the sole of the right foot remaining flat on the ground; the right leg must be straight and firm; in this position the left knee must be flexed or bent; the ball of the left foot touching the ground firmly, while the heel is elevated, such as we frequently see in statues or statuettes; pause a while, and do likewise with the left limb and foot; in other words, both limbs and feet must be made to function alike in this artistic walking, until the student shall have acquired the art of walking gracefully, regardless of arm movements, facial expression, or vocal display.

In conclusion, let him try his ability to walk to a chair, seat himself, remain there a few moments without moving his feet; rise up without moving his feet, and walk away gracefully without more manœuvring than is absolutely necessary to per-

form the feat. Above all things, see that the divergent angle of one foot is neither greater nor lesser than the other.

PASSIONS. With regard to the passions, they may be compared to all the other elements of the soul, body, or mind; and in point of extreme measurement must be divided into positive, Love, and negative, Anger. The positive, Love, must be depicted, *extreme*, regardless of every modification, pure, in itself, of itself; *per se*, neither flavoring nor savoring of any passional hue whatsoever. The same may be said of the negative passion, Anger.

Let the student select some piece of poetry, embracing some twenty or thirty lines of elegant and well-impassioned poetic features, defining in a most marked manner the passions of Love and Anger; let him impersonate the same intensely, yet passively, internally considered.

To satisfy himself he is on the right course, let him read the composition in an ordinary parliamentary tone, employing the natural diapason of his common daily-speaking voice; then employ the *affirmative* melody, after which the *interroga-*

tive, then the *negative*, and finally the *interrogative* and *negative* melodies combined.

This will give him an idea of the employment of all affirmative, interrogative, negative, and interrogative and negative melodies.

After having studied this *modus operandi* of procedure, let him describe the situation of the recitation as if he were relating it to an individual friend, a small drawing-room audience, or a large assembly of hypercritical critics, so that he may be enabled to regulate or apportion the necessary amount of volume and intensity required for the occasion.

The chart numbers 1, 2, 3, and 4, at the end of this work, should be recited, or gone over by the student, once every day.

Chart No. 1 contains permutations of the common chord, with its attendant harmonies. It embraces the chord of the sub-dominant (1, 4, 6, 8), which may be sang either in the major or minor mode; the chord of the dominant seventh (2, 4, 5, 7); the chord of the minor seventh (1, 3, 5, 7 dim.), which may be made the grand chord of the diminished seventh, by throwing up the tonic half a tone.

In these chords there may be found the existence of all the intervals belonging to music: major intervals, minor intervals, diminished intervals, augmented intervals, inverted intervals, and, finally, the two grand perfect intervals—the fourth and fifth. Practice them without the aid of any musical instrument, save the timely employment of a simple tuning fork. In the singing of them, employ the natural power of the voice, and, above all things, see that you neither split the voice in going from one interval to another, nor make the least slur. In other words, do not let the articulation of one intonation partake of, in the least, the intonation of the succeeding sound. The same instructions will apply to the recital of the permuted vowels, with this difference: that the organic vowel sounds, a and o, pronounced ah and oh, should be practiced upon a steady intonation, with the mouth widely opened, and held firm by the introduction of the points of the three first fingers, and there retained during the moulding of these two organic vowel sounds. Use the same functioning process for the vowels e and u, pronounced eh and oo, with the points of two fingers holding the jaws firmly apart. Finally, use only one finger for the organic

vowel sound i, pronounced e; and if desirous of educating the mouth to a French pronunciation, add the closed sound of the French u, when you will have the sounds of e, and e closed. In the articulation of the latter vowel sound, draw the lips closely together; a, o, e, u, i, and e closed, gives us therefore six distinct organic vowel sounds.

The chart on consonant articulation explains itself, and so does the chart on vocal quantity.

For further particulars on vocal quantity, (a most essential study,) I would respectfully refer the student to Gardner's "Music of Nature."

DR. GUILMETTE'S VOCAL EXERCISES.

CHART NUMBER ONE.

1.	2.	3.	4.
1 3 5 8	1 4 6 8	1 3 5 7 ^b	2 4 5 7
1 3 8 5	1 4 8 6	1 3 7 ^b 5	2 4 7 5
1 5 3 8	1 6 4 8	1 5 3 7 ^b	2 5 4 7
1 5 8 3	1 6 8 4	1 5 7 ^b 3	2 5 7 4
1 8 3 5	1 8 4 6	1 7 ^b 3 5	2 7 4 5
1 8 5 3	1 8 6 4	1 7 ^b 5 3	2 7 5 4
3 1 5 8	4 1 6 8	3 1 5 7 ^b	4 2 5 7
3 1 8 5	4 1 8 6	3 1 7 ^b 5	4 2 7 5
3 5 1 8	4 6 1 8	3 5 1 7 ^b	4 5 2 7
3 5 8 1	4 6 8 1	3 5 7 ^b 1	4 5 7 2
3 8 1 5	4 8 1 6	3 7 ^b 1 5	4 7 2 5
3 8 5 1	4 8 6 1	3 7 ^b 5 1	4 7 5 2
5 1 3 8	6 1 4 8	5 1 3 7 ^b	5 2 4 7
5 1 8 3	6 1 8 4	5 1 7 ^b 3	5 2 7 4
5 3 1 8	6 4 1 8	5 3 1 7 ^b	5 4 2 7
5 3 8 1	6 4 8 1	5 3 7 ^b 1	5 4 7 2
5 8 1 3	6 8 1 4	5 7 ^b 1 3	5 7 2 4
5 8 3 1	6 8 4 1	5 7 ^b 3 1	5 7 4 2
8 1 3 5	8 1 4 6	7 ^b 1 3 5	7 2 4 5
8 1 5 3	8 1 6 4	7 ^b 1 5 3	7 2 5 4
8 3 1 5	8 4 1 6	7 ^b 3 1 5	7 4 2 5
8 3 5 1	8 4 6 1	7 ^b 3 5 1	7 4 5 2
8 5 1 3	8 6 1 4	7 ^b 5 1 3	7 5 2 4
8 5 3 1	8 6 4 1	7 ^b 5 3 1	7 5 4 2

STA-BAT MA-TER DO-LO-RO-SA,
 JUX-TA CRU-CEM LA-CRI-MO-SA;
 DUM PEN-DE-BAT FI-LI-US.

DR. GUILMETTE'S VOCAL EXERCISES.

CHART NUMBER TWO.

PERMUTATIONS

OF THE

FIVE ORGANIC VOWEL SOUNDS, I E U A O.

N. B.—Let there be a pause and firm moulding of the sounds which Dr. Guilmette represents by these characters.

$1 \times 2 \times 3 \times 4 \times 5 = 120$ THE NUMBER OF THE PERMUTATIONS.

EXERCISES.

I.	II.	III.	IV.	V.
i e u a o	i u e a o	i a e u o	i o e u a	e i u a o
i e u o a	i u e o a	i a e o u	i o e a u	e i u o a
i e a u o	i u a e o	i a u e o	i o u e a	e i a u o
i e a o u	i u a o e	i a u o e	i o u a e	e i a o u
i e o u a	i u o e a	i a o e u	i o a e u	e i o u a
i e o a u	i u o a e	i a o u e	i o a u e	e i o a u

<p>VI. u i a o e u i o a e u a i o e u a o i e u o i a e u o a i</p>	<p>VII. e a i u o e a i o u e a u i o e a u o i e a o i u e a o u i</p>	<p>VIII. e o i u a e o i a u e o u i a e o u a i e o a i u e o a u i</p>	<p>IX. u i e a o u i e o a u i a e o u i a o e u i o e a u i o a e</p>	<p>X. u e i a o u e i o a u e a i o u e a o i u e o i a u e o a i</p>
<p>XI. u a i e o u a i o e u a e i o u a e o i u a o i e u a o e i</p>	<p>XII. u o i e a u o i a e u o e i a u o e a i u o a i e u o a e i</p>	<p>XIII. a i e u o a i e o u a i u e o a i u o e a i o e u a i o u e</p>	<p>XIV. a e i u o a e i o u a e u i o a e u o i a e o i u a e o u i</p>	<p>XV. a u i e o a u i o e a u e i o a u e o i a u o i e a u o e i</p>
<p>XVI. a o i e u a o i u e a o e i u a o e u i a o u i e a o u e i</p>	<p>XVII. o i e u a o i e a u o i u e a o i u a e o i a e u o i a u e</p>	<p>XVIII. o e i u a o e i a u o e u i a o e u a i o e a i u o e a u i</p>	<p>XIX. o u i e a o u i a e o u e i a o u e a i o u a i e o u a e i</p>	<p>XX. o a i e u o a i o e o a e i u o a e o i o a o i e o a o e i</p>

DR. GUILMETTE'S VOCAL EXERCISES.

CHART NUMBER THREE.

CLASSIFICATION AND PERMUTATION

OF THE

ORGANIC LABIAL, LINGUAL,

AND

LARYNGEAL ARTICULATIONS.

I.—ORGANIC LABIAL ARTICULATIONS.

Labial Proper,	P——P
Semi-Labial,	F——F

II.—ORGANIC LINGUAL ARTICULATIONS.

Apex of the Tongue Straight, - - -	T——T	- Hard.
Apex of the Tongue Curved, - - -	L——L	- Soft.
Dorsum of the Tongue Arched, - - -	K——K	- Hard.
Apex of the Tongue Straight, - - -	R——R	- Hard Vibratory.
Apex of the Tongue Curved, - - -	R——R	- Soft Vibratory.

III.—ORGANIC LARYNGEAL ARTICULATIONS.

B——B	G——G	D——D	V——V
------	------	------	------

N. B.—1. The principal Laryngeal Sound represented by the character B should, for the purpose of enlarging the chamber of the larynx, be practised *forcibly*, several times a day, regardless of the grammatical *name* which designates it as a Consonant.

2. Prefix the articulation of each of the above Consonants to the closed Organic Vowel I, taking care to keep passive those vocal organs whose immediate functioning is not required. Let the *mind* be very vigilant over the active organ and none other, taking care to retain it for a second or more in its position, after the articulation shall have been given.

3. The same rule should be strictly observed in the moulding of the Organic *Vowel* sounds. Otherwise, the slurring and drawing of the vocal *element* will be the result, and a miserably defined vowel will characterize the performance of the singer or speaker.

CHART NUMBER THREE. (CONTINUED.)

EXERCISES ON THE PERMUTATIONS OF THE LABIALS, LINGUALS, AND LARYNGEALS.

1.—The Twenty four Permutations of the Linguals T L K R.

TLKR	TKLR	TRLK	LTKR	KTLR	RTLK
TLRK	TKRL	TRKL	LTRK	KTRL	RTKL
KRTL	RKTL	LKTR	LRTK	KLTR	RLTK
KRLT	RKLT	LKRT	L RKT	KLRT	RLKT

2.—The Twenty-four Permutations of the Labials P and F, with the Laryngeals B and G.

PFBG	PBFG	PGFB	F P B G	B P F G	G P F B
PFBG	PBGF	PGBF	F P G B	B P G F	G P B F
BGPF	GBPF	FBPG	F G P B	B F P G	G F P B
BGFP	GBFP	FBGP	F G B P	B F G P	G F B P

3.—The Twenty-four Permutations of the Principal Labial P with the Two Principal Linguals T and K and the Principal Laryngeal B.

PTKB	PKTB	PBTK	T P K B	K P T B	B P T K
PTBK	PKBT	PBKT	T P B K	K P B T	B P K T
KBPT	BKPT	TKPB	T B P K	K T P B	B T P K
KBTP	BKTP	TKBP	T B K P	K T B P	B T K P

DR. GUILMETTE'S VOCAL EXERCISES.

CHART No. IV.

ON QUANTITY.

Words on the bar.

 seven inches.

					
Breathe	All	Fierce	Man	Bet	Pit-ty
Swarm	Charm	Fire	Boy	It	Minute
Dream	Soul	Power	Dog	Pit	<i>Minnet</i>






				
Damage	Ef-fi-gy	To-ry	Ei-ther	Wor-thi-ly
Pic-ture	Chival-ry	Puisne	Grandeur	Cor-di-al
<i>Pik-cher</i>	<i>Shivalry</i>	<i>Pu-ne</i>	<i>Gran-fer</i>	<i>Cor-js-al</i>

			
Vic-to-ry	Mis-chie-vous	In-fi-nite	Loy-al-ty
Te-di-um	I-di-om	Im-pi-ous	Im-pu-dent
<i>Te-je-um</i>	<i>I-js-um</i>	Ex-tir-pate	In-ju-ry

		
Mu-si-cal-ly	I-ma-ge-ry	Mis-rep-re-sen-ta-tion
Ho-no-ra-ble	Ce-re-mo-ny	Ex-com-mu-ni-ca-tion

			
Im-pos-si-bility	Im-pe-ne-tra-bi-lity	In-com-pre-hen-si-bility	

Syllables before the bar.

				
Ac-quit	De-lay	Ap-prove	Pa-ci-fic	Per-se-vere
E-mit	Gal-lant	Be-guile	In-trepid	Ma-ga-zine
De-pict	Mamma	De-lude	Fa-na-tic	In-va-lid

ON QUANTITY.






 E - pi - demic Mis - de - mean - or O - be - di - ent Dis - dain - ful
 Pa - ne - gy - ric Con - tra - dic - tion O - be - je - nt Dis - grace - ful






 Le - thar - gic Im - me - di - ately Ju - di - cious I - den - ti - ty
 E - nor - mous E - me - jit - ly In - si - pid Mag - ni - ficent





 A - bom - in - a - ble In - di - vi - du - al Machi - na - tion
 Un - pardon - a - ble Hy - po - the - ti - cal Ma - ke - na - shen





 Minis - te - ri - al Multi - pli - ci - ty Dis - pro - por - tion - a - bly
 Im - per - cepti - ble In - de - fatig - a - ble Un - in - tel - li - gi - ble






 Dis - o - be - di - ent E - ty - mo - lo - gi - cal Re - crim - i - na - tion
 Hip - po - pot - a - mus Spi - ri - tu - al - i - ty Hu - mi - li - a - tion




 En - cyclo - pe - di - a Re - com - men - da - to - ry




 Qua - li - fi - ca - tion Hie - ro - gly - phi - cal





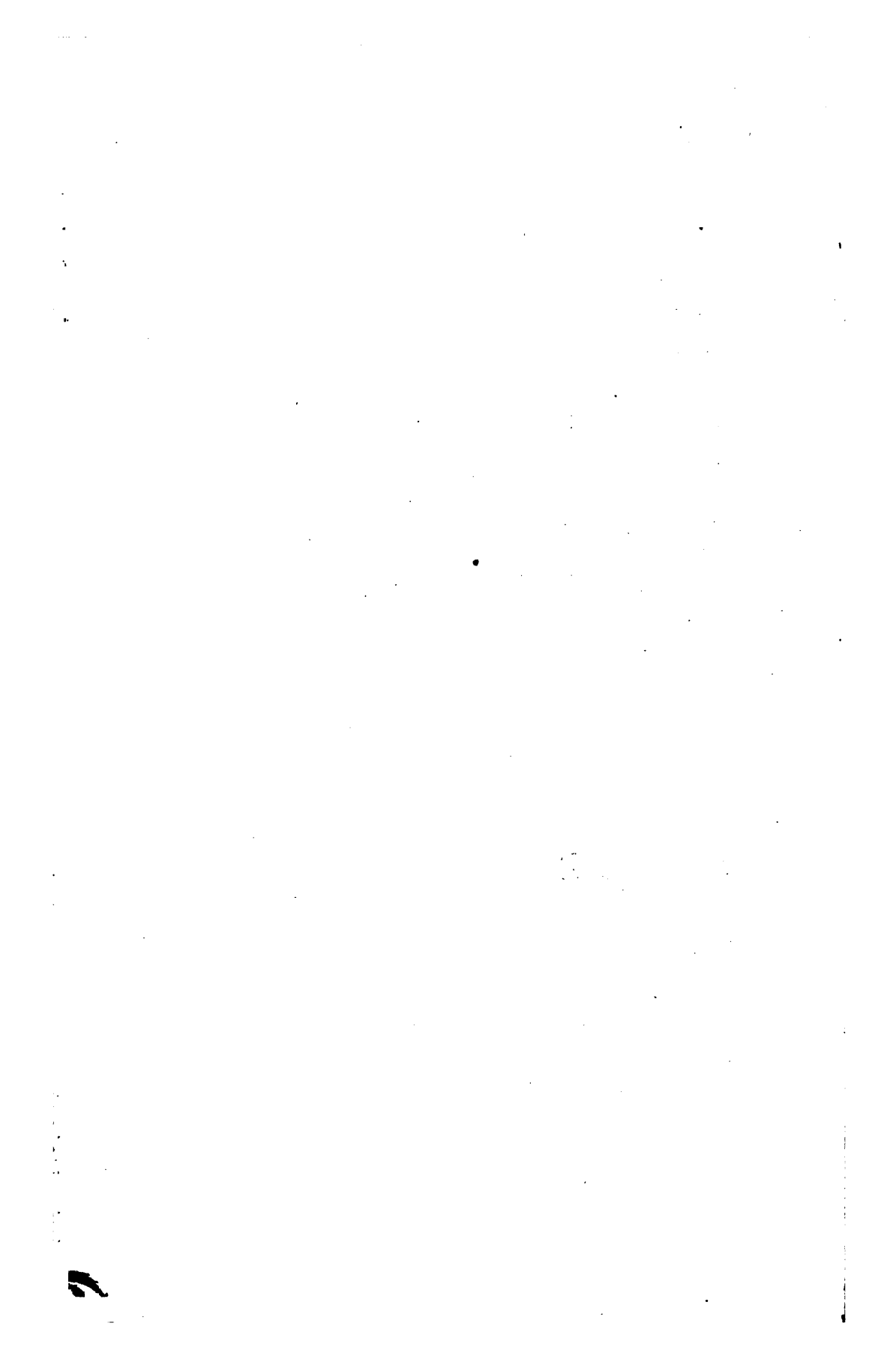
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 Mal - ad - min - is - tra - tion Ra - si - o - si - na - chen




 Im - ma - te - ri - a - li - ty Va - le - tu - di - na - ri - an.

(GARDNER.)

Editor—Rev. Edward Winthrop.



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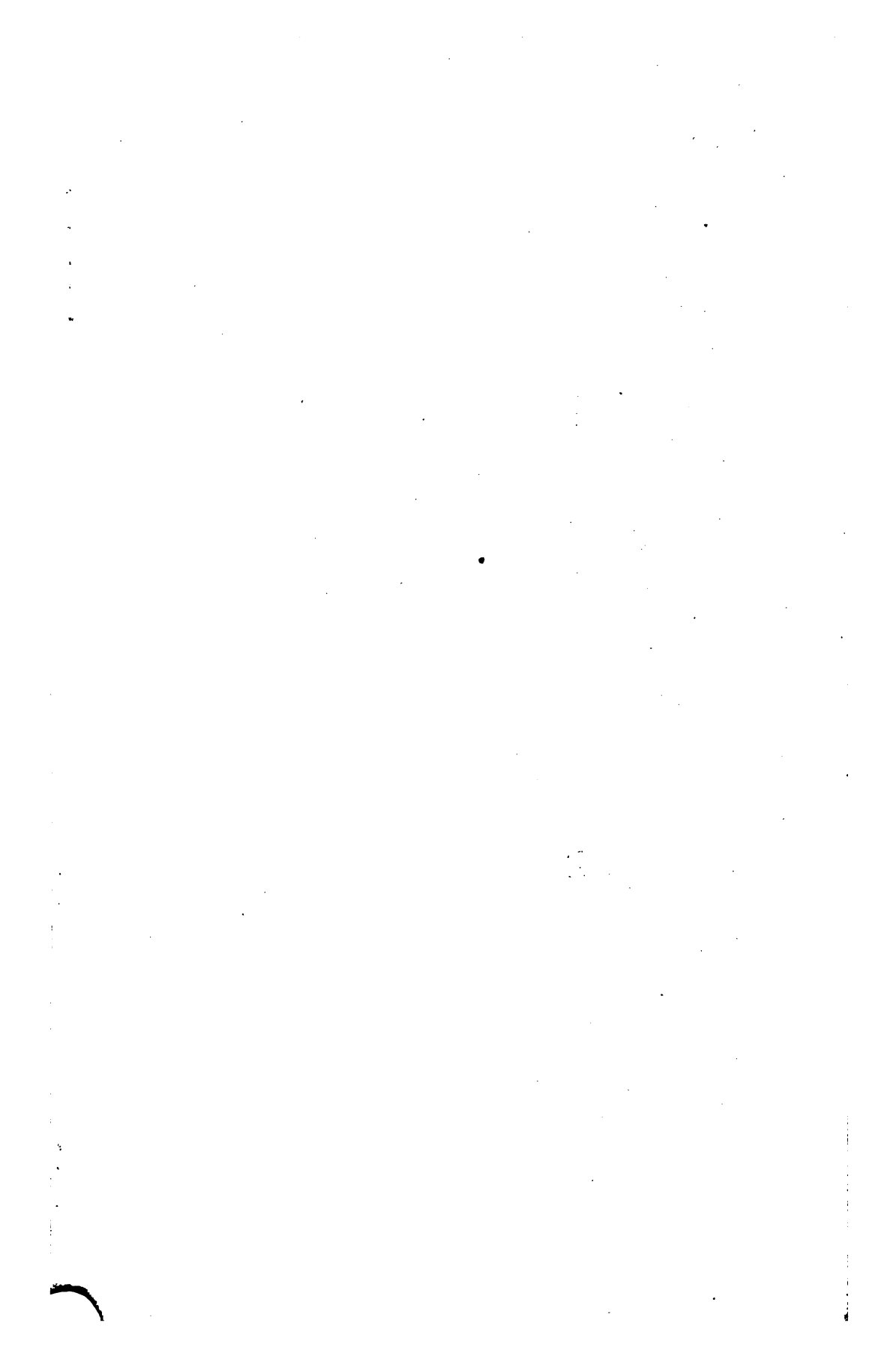
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